

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A23L1/212 A23L1/064 A23B7/005

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A23L A23B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, FSTA, BIOSIS

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DATABASE FSTA 'Online! INTERNATIONAL FOOD INFORMATION SERVICE (IFIS), FRANKFURT/MAIN, DE; KARIM M A ET AL: "Effect of heat processing on the quality of canned mango pulp." XP002262296 Database accession no. 72-2-04-j0564 abstract &amp; PAKISTAN JOURNAL OF SCIENTIFIC RESEARCH 1970 DEPT. OF FOOD TECH., AGRIC. UNIV., LYALLPUR, W. PAKISTAN, vol. 22, no. 1/2, 1970, pages 44-50,</p> <p style="text-align: center;">----- -/-</p>	1-8, 25

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- \*Z\* document member of the same patent family

Date of the actual completion of the international search

2 November 2004

Date of mailing of the international search report

17/11/2004

Name and mailing address of the ISA

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE FSTA 'Online! INTERNATIONAL FOOD INFORMATION SERVICE (IFIS), FRANKFURT/MAIN, DE; CARVALLO P M S ET AL: "Formulation of an avocado paste product." XP002262297 Database accession no. 84-2-09-j1551	1-8,13, 25
A	abstract & ALIMENTOS FAC. DE INGENIERIA, GENERAL CRUZ NO. 34, VALPARAISO, CHILE, vol. 8, no. 4, 1983, pages 9-14, -----	21,22
X	US 5 298 275 A (BALASINGHAM AMARANATHAN ET AL) 29 March 1994 (1994-03-29)	1-8,13, 25
A	column 3, line 39 - column 4, line 58 column 6, line 54 - column 7, line 60 column 11, line 45 - column 12, line 21 examples 1-3 claims 1,10,13,17 -----	20,22-24
X	US 5 871 794 A (BRITO JORGE ISSAC) 16 February 1999 (1999-02-16)	1-8,13, 25
A	cited in the application the whole document -----	9-11,16, 18-23
X	DE 11 01 118 B (HANS ADALBERT SCHWEIGART DR) 2 March 1961 (1961-03-02)	1,2, 4-13,16, 18,19,25
A	the whole document -----	21-24
X	DATABASE FSTA 'Online! INTERNATIONAL FOOD INFORMATION SERVICE (IFIS), FRANKFURT/MAIN, DE; MARTIN Z DE ET AL: "Industrial production of guava pulp, red variety." XP002262298 Database accession no. 76-1-05-j0655 abstract & COLETANEA DO INSTITUTO DE TECNOLOGIA DE ALIMENTOS, vol. 6, no. 1, 1975, pages 11-36, -----	1,2,4-8, 13,25
X	DATABASE FSTA 'Online! INTERNATIONAL FOOD INFORMATION SERVICE (IFIS), FRANKFURT/MAIN, DE; RODRIGUEZ A J ET AL: "Evaluation of papaya nectar prepared from unpeeled papaya puree." XP002262299 Database accession no. 72-2-10-j1593	1,2,4-8, 13,25
A	abstract ----- -/-	20,22-24

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	& JOURNAL OF AGRICULTURE OF THE UNIVERSITY OF PUERTO RICO FOOD TECH. LAB., AGRIC. EXPT. STA., MAYAGÜEZ CAMPUS, UNIV. OF PUERTO RICO, USA, vol. 56, no. 1, 1972, pages 79-80, -----	
X	US 5 900 267 A (MONROS SALVADOR CORET) 4 May 1999 (1999-05-04)	1,2, 4-13, 16-19,25 21-24
A	the whole document	
X	US 2002/197385 A1 (TOVES FRANCES ANN) 26 December 2002 (2002-12-26)  paragraph '0010! - paragraph '0016! paragraph '0029! paragraph '0033! - paragraph '0044! examples 1,2 claims 1,3,4,6-8,15-18 -----	1-13, 16-19, 21-25
X	FR 2 621 224 A (DESJONQUERES OLIVIER) 7 April 1989 (1989-04-07) the whole document	1-8,25
X	EP 0 850 572 A (BERTOCCHI ALESSANDRO) 1 July 1998 (1998-07-01)	1,4-8,25
A	column 1, line 3 - line 38 column 3, line 26 - column 5, line 20 claim 1 -----	21-24
X	EP 0 429 966 A (MEIDI YA FOOD FACTORY) 5 June 1991 (1991-06-05)  the whole document	1,2, 4-11,13, 16,18, 19,25
X	US 4 139 647 A (DOUGLAS GEORGE) 13 February 1979 (1979-02-13)  column 2, line 8 - column 3, line 26 claims 1,2 -----	1,2, 4-18, 21-25
A	US 2002/068125 A1 (TAN MAY CHU ET AL) 6 June 2002 (2002-06-06) the whole document	1-8,20, 22-25
X	FR 2 294 649 A (GERBER PROD) 16 July 1976 (1976-07-16)	9-11,13, 17-19,25
A	page 1, line 1 - line 7 examples 2,3 claim 1 -----	7,21-23
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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 4 413 017 A (LOADER MARY A) 1 November 1983 (1983-11-01) column 3, line 49 - column 4, line 65  column 7, line 53 - column 9, line 39 example 1 claims 1,2,6-13	1,2,6-8, 21-25 9-13, 17-19
X A	US 5 879 737 A (ASHOURIAN JAMSHID) 9 March 1999 (1999-03-09) column 2, line 45 - column 5, line 10 examples 1,2,5 tables 1,2 claims 1,2,8-10	9-11,13, 16-19,25  21-24
A	DATABASE FSTA 'Online! INTERNATIONAL FOOD INFORMATION SERVICE (IFIS), FRANKFURT/MAIN, DE; WILLS R B H ET AL: "Storage of two new cultivars of guava fruit for processing." XP002262300 Database accession no. 83-3-12-j1934 abstract & TROPICAL AGRICULTURE SCHOOL OF FOOD TECH., UNIV. OF NEW SOUTH WALES, PO BOX 1, KENSINGTON, NSW 2033, AUSTRALIA, vol. 60, no. 3, 1983, pages 175-178,	4,20, 22-24
A	DATABASE BIOSIS 'Online! BIOSCIENCES INFORMATION SERVICE, PHILADELPHIA, PA, US; 1987, SEYMOUR G B ET AL: "INHIBITION OF DEGREENING IN THE PEEL OF BANANAS RIPENED AT TROPICAL TEMPERATURES I. EFFECT OF HIGH TEMPERATURE ON CHANGES IN THE PULP AND PEEL DURING RIPENING" XP002262301 Database accession no. PREV198784003621 abstract & ANNALS OF APPLIED BIOLOGY, vol. 110, no. 1, 1987, pages 145-152, ISSN: 0003-4746	4,20,22
P,X	WO 2004/037017 A (UNILEVER PLC ; LEVER HINDUSTAN LTD (IN); UNILEVER NV (NL)) 6 May 2004 (2004-05-06) the whole document	1-25

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-8, 13 (part), 20, 22(part), 23(part), 25(part)

Stabilized fruit pulp and method for making a stabilized fruit pulp composition

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2. claims: 9-12, 13(part), 14-19, 21, 22(part), 23(part), 25(part)

Stable puree composition method for making a stabilised fruit puree composition

Common features between independent claims 1, 9, 20, 21 and 25 is a fruit pulp comprising chunks, said chunks having dimensions from about 1x1x1 mm to about 15x15x15 mm.

These dimensions are common to almost all fruit pulp compositions and are therefore unsuitable for defining an inventive concept, since these technical features in combination are not special, considering that they do not define any contribution over the prior art.

Independent claim 1 relates to a stabilized fruit pulp composition, claim 20 to a method for making a stabilized fruit pulp composition and claim 25 to a product produced by said method. The feature in common is a heating step of less than 90° min for less than 4 min. This short time pasteurization step does also not define any contribution over the prior art (see eg US2002/197385).

Independent claim 9 relates to a stable puree composition, claim 21 to a method for making a stabilised fruit puree composition and claim 25 to a product produced by the process of claim 21. The additional feature in common is the presence of a thickening base. A pulp comprising a thickening base is already known in the art and thus does not define any contribution over the prior art (see US2002/197385).

Please note that all inventions mentioned under groups 1 and 2, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

As set out above, there is no technical relationship between special technical features in the sense of R. 13 PCT and claims 1, 9, 20, 21 and 25 define different inventions.

The groups of inventions are therefore:

Group 1.1 (Claims 1-8, 13(part))

Group 1.2 (Claim 20, 22(part), 23(part), 25(part))

Group 2.1 (Claims 9-13(part), 14-19)

Group 2.2 (Claims 21, 22(part), 23(part), 25(part))

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**Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

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US 5298275	A	29-03-1994	NZ	235972 A	27-04-1995
			US	5500241 A	19-03-1996
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			WO 2004037017 A1	06-05-2004
			US 2004081742 A1	29-04-2004





DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	DATABASE FSTA 'Online! INTERNATIONAL FOOD INFORMATION SERVICE (IFIS), FRANKFURT/MAIN, DE; KARIM M A ET AL: "Effect of heat processing on the quality of canned mango pulp." Database accession no. 72-2-04-j0564 XP002262296 * abstract * & PAKISTAN JOURNAL OF SCIENTIFIC RESEARCH 1970 DEPT. OF FOOD TECH., AGRIC. UNIV., LYALLPUR, W. PAKISTAN, vol. 22, no. 1/2, pages 44-50, --- -/--	1-8	A23L1/212 A23L1/064 A23B7/005
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			A23L A23B

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

The present partial European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims.

Place of search

MUNICH

Date of completion of the search

18 December 2003

Examiner

Krajewski, D

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone  
Y: particularly relevant if combined with another document of the same category  
A: technological background  
O: non-written disclosure  
P: intermediate document

T: theory or principle underlying the invention  
E: earlier patent document, but published on, or after the filing date  
D: document cited in the application  
L: document cited for other reasons

& : member of the same patent family, corresponding document



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	DATABASE FSTA 'Online! INTERNATIONAL FOOD INFORMATION SERVICE (IFIS), FRANKFURT/MAIN, DE; CARVALLO P M S ET AL: "Formulation of an avocado paste product." Database accession no. 84-2-09-j1551 XP002262297 * abstract * & ALIMENTOS 1983 FAC. DE INGENIERIA, GENERAL CRUZ NO. 34, VALPARAISO, CHILE, vol. 8, no. 4, pages 9-14, ---	1-8	
X	US 5 298 275 A (BALASINGHAM AMARANATHAN ET AL) 29 March 1994 (1994-03-29)	1-8	
A	* column 3, line 39 - column 4, line 58 * * column 6, line 54 - column 7, line 60 * * column 11, line 45 - column 12, line 21 * * examples 1-3 * * claims 1,10,13,17 * ---	20,22,23	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
X	US 5 871 794 A (BRITO JORGE ISSAC) 16 February 1999 (1999-02-16)	1-8	
A	* the whole document * ---	20,22,23	
X	DE 11 01 118 B (HANS ADALBERT SCHWEIGART DR) 2 March 1961 (1961-03-02) * the whole document * ---	1,2,4-8	
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DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	DATABASE FSTA 'Online! INTERNATIONAL FOOD INFORMATION SERVICE (IFIS), FRANKFURT/MAIN, DE; MARTIN Z DE ET AL: "Industrial production of guava pulp, red variety." Database accession no. 76-1-05-j0655 XP002262298 * abstract * & COLETANEA DO INSTITUTO DE TECNOLOGIA DE ALIMENTOS 1975, vol. 6, no. 1, pages 11-36, ---	1,2,4-8	
X	DATABASE FSTA 'Online! INTERNATIONAL FOOD INFORMATION SERVICE (IFIS), FRANKFURT/MAIN, DE; RODRIGUEZ A J ET AL: "Evaluation of papaya nectar prepared from unpeeled papaya puree." Database accession no. 72-2-10-j1593 XP002262299 * abstract * & JOURNAL OF AGRICULTURE OF THE UNIVERSITY OF PUERTO RICO 1972 FOOD TECH. LAB., AGRIC. EXPT. STA., MAYAGÜEZ CAMPUS, UNIV. OF PUERTO RICO, USA, vol. 56, no. 1, pages 79-80, ---	1,2,4-8	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
A	* abstract * & JOURNAL OF AGRICULTURE OF THE UNIVERSITY OF PUERTO RICO 1972 FOOD TECH. LAB., AGRIC. EXPT. STA., MAYAGÜEZ CAMPUS, UNIV. OF PUERTO RICO, USA, vol. 56, no. 1, pages 79-80, ---	20,22,23	
X	US 5 900 267 A (MONROS SALVADOR CORET) 4 May 1999 (1999-05-04) * the whole document * ---	1,2,4-8	
X	US 2002/197385 A1 (TOVES FRANCES ANN) 26 December 2002 (2002-12-26) * paragraph '0010! - paragraph '0016! * * paragraph '0033! - paragraph '0044! * * examples 1,2 * * claims 1,3,4,6,7,15-18 * --- -/--	1-8	



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	FR 2 621 224 A (DESJONQUERES OLIVIER) 7 April 1989 (1989-04-07) * the whole document *	1-8	
X	EP 0 850 572 A (BERTOCCHI ALESSANDRO) 1 July 1998 (1998-07-01) * column 1, line 3 - line 38 * * column 3, line 26 - column 5, line 20 * * claim 1 *	1,4-8	
X	EP 0 429 966 A (MEIDI YA FOOD FACTORY) 5 June 1991 (1991-06-05) * the whole document *	1,2,4-8	
X	US 4 139 647 A (DOUGLAS GEORGE) 13 February 1979 (1979-02-13) * column 2, line 8 - column 3, line 26 * * claims 1,2 *	1,2,4-8	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
A	US 2002/068125 A1 (TAN MAY CHU ET AL) 6 June 2002 (2002-06-06) * the whole document *	1-8,20, 22,23	
A	DATABASE FSTA 'Online! INTERNATIONAL FOOD INFORMATION SERVICE (IFIS), FRANKFURT/MAIN, DE; WILLS R B H ET AL: "Storage of two new cultivars of guava fruit for processing." Database accession no. 83-3-12-j1934 XP002262300 * abstract * & TROPICAL AGRICULTURE 1983 SCHOOL OF FOOD TECH., UNIV. OF NEW SOUTH WALES, PO BOX 1, KENSINGTON, NSW 2033, AUSTRALIA, vol. 60, no. 3, pages 175-178, -/-	4,20,22, 23	



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	DATABASE BIOSIS 'Online! BIOSCIENCES INFORMATION SERVICE, PHILADELPHIA, PA, US; 1987 SEYMOUR G B ET AL: "INHIBITION OF DEGREENING IN THE PEEL OF BANANAS RIPENED AT TROPICAL TEMPERATURES I. EFFECT OF HIGH TEMPERATURE ON CHANGES IN THE PULP AND PEEL DURING RIPENING" Database accession no. PREV198784003621 XP002262301 * abstract * & ANNALS OF APPLIED BIOLOGY, vol. 110, no. 1, 1987, pages 145-152, ISSN: 0003-4746 ---	4,20,22	
A	DATABASE FSTA 'Online! INTERNATIONAL FOOD INFORMATION SERVICE (IFIS), FRANKFURT/MAIN, DE; PRABHA T N ET AL: "Polyphenol oxidase (PPO) and peroxidase (POD) enzyme activities and their isoenzyme patterns in ripening fruits." Database accession no. 87-1-07-j0002 XP002262302 * abstract * & ACTA ALIMENTARIA 1986 CENT. FOOD TECH. RES. INST., MYSORE-570013, INDIA, vol. 15, no. 3, pages 199-207, -----	4,20,22	TECHNICAL FIELDS SEARCHED (Int.Cl.7)



The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-8, 20, 22(part), 23(part)

Stabilized fruit pulp and method for making a stabilized fruit pulp composition

2. Claims: 9-19, 21, 22(part), 23(part)

Stable puree composition method for making a stabilised fruit puree composition

Common features between independent claims 1, 9, 20 and 21 is a fruit pulp comprising chunks, said chunks having dimensions from about 1x1x1 mm to about 15x15x15 mm. These dimensions are common to almost all fruit pulp compositions and are therefore unsuitable for defining an inventive concept, since these technical features in combination are not special, considering that they do not define any contribution over the prior art.

Independent claim 1 relates to a stabilized fruit pulp composition and claim 20 to a method for making a stabilized fruit pulp composition. The feature in common is a heating step of less than 90° min for less than 4 min. This short time pasteurization step does also not define any contribution over the prior art (see eg US2002/197385). Please note that all inventions mentioned under item 1, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

Independent claim 9 relates to a stable puree composition and 21 to a method for making a stabilised fruit puree composition. The additional feature in common is the presence of a thickening base. A pulp comprising a thickening base is already known in the art and thus does not define any contribution over the prior art (see US2002/197385). Please note that all inventions mentioned under item 2, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

As set out above, there is no technical relationship between special technical features in the sense of R. 30 EPC and claims 1, 9, 20 and 21 define different inventions.

The groups of inventions are therefore:

Group 1.1 (Claims 1-8)

Group 1.2 (Claim 20, 22(part), 23(part))

Group 2.1 (Claims 9-19)

Group 2.2 (Claims 21, 22(part), 23(part))

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 03 25 3938

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-12-2003

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
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## This text has been automatically translated from German into English

Description OF DE1101118 procedure for the durable making of vegetable and fruits one already tried, contents materials of vegetable and fruits, which are subject easily to a change by oxidative influences to conserve by honey or sugar kinds. Here one proceeded often from diluted honey solutions, but too keenly satisfying result came. Straight if it around highly sensitive vegetables or fruits acts, is unsatisfactory the storage results. One receives pro after some time dukte, which are changed in their taste and since ago no more do not correspond to the complete economic value. Particularly this applies, if it concerns vegetables and fruits, with which the straight Geschmackseigenschaften of special importance is. For example meerrettich, young carrots or also apples, which len in rubbed condition their full content of flavour materials and taste materials kept sol, do not leave themselves with the well-known procedures to out be enough to make durable. Meerrettich will already diminish after few days in its taste and after some weeks will be nearly tasteless. One tried already vegetables and fruits with honey alone or also with honey and sugar too more konser four or also e.g. alone conserved meerrettich with sauce. The taste and that always leave after short time. Flavour of the commodity to wish remaining, if at all a durability is obtained over longer time. If one however, how in accordance with available Erfindung is characteristic, which trains treatment of vegetable and fruits further with honey and Invertzucker there and/or zellen monomers sugars that one uses mixtures of honey and Invertzucker, in which a component monomers of the kinds of sugar can outweigh, and in addition to approximately 3 to 3.8 lowers the pH value, then one obtains one ausserordentlich surprising and very valuable success. With a months-long storage such plant parts, meerrettich, e.g. rubbed, remain completely fresh and one has a taste feeling as before with directly rubbed meerrettich. Aehnlicherweise can be conserved other kinds of vegetable, green Gemuese as well as root vegetable, also fruit, insbesondere rubbed apples, regarding their content of flavour and odoriferous substances. This reduction of the value (fresh sea radish it shows a pH value from approximately 4.1 to 4.4) hires also that the enzyme systems of the treated plant parts to remain intact and with the consumption thus fully to the effect to come be able. The reduction of the pH value takes place appropriately via additive of small quantities of benefitable acids, e.g. organic acids, although, if inorganic acids, e.g., do not disturb hydrochloric acid, which can take place weak acidifying also by hydrochloric acid. Preferably the so-called benefit acids, e.g. Citronensaure, tartaric acid, malic acid, milk acid, acetic acid, are used ascorbic acid. The stopbarkeit can be increased further by additive from 1 to approximately 6% Lipoiden. The added quantities of in more vertzucker or monomers kinds of sugar should be least water-poor moeg. While the usual in exhibits more vertzucker approximately 2014 water, for the available procedure prefers such Invert kinds of sugar or monomers sugars uses, which substantially less, only about 8 to 10%, free water to exhibit. It is also characteristic for the available procedure that one mixtures of honey, which predominantly consists of Invertzucker and Invertzucker and its Komponenten whom det, because one has straight then the possibility as previously mentioned, the one monomer sugar component, e.g. those glucose to hold in a surplus in relation to other monomers the sugar component. Meerrettich and similar plant parts are neither with fat nor with honey alone durable, probably however with fat and honey with simultaneous pH correction, e.g. with Citronensaure. Fat the reactive Partikelchen of the enzyme systems stabilized with syrup or honey covers and probably protects by Bildung of accumulation products the flavour materials of the fruits and vegetables. The execution way of the available invention is capable of of multiple variations, e.g. one knows the Invertzucker from tubing or ruebenzucker by in vertierung with a benefit acid, e.g. Citronensaure or lactic acid or also Citronensaft manufactures, and after mix the sour Invertzuckerloesung directly with honey for treating the fruits and vegetables to use. Also one can bring honey, to Invert sugars, Lipoiden and acid in a common waessrigen emulsion to application, or one can mix also the vegetable

or the fruits in ground form first with a Lipoidemulsion (fats and/or oils, Lecithine) and take then the Behand lung with the honey Invertzucker mixture and the attitude of the pH value on approximately 3 to 3.8 forwards. After a further execution form of the Erfindung one can absorb at the same time or afterwards beer-ends fillers to add, which let the flavour and the taste materials of the vegetables and fruits come then completely particularly well to the effect. It is still again stressed the fact that drive available for a multiplicity of fruits and vegetables is applicable. As fruits are possible such all kind. As examples above all also bananas are mentioned beside apples and Birnen. The available procedure one knows on vegetable, e.g. root vegetable, like carrots, radish, Meerrettich, tuber vegetable, e.g. sellerie, potatoes, Röhrenzwiege, like topinambur, Hypokotyle, as saves gel, furthermore on sheet vegetables, like spinach, when exit materials use. Furthermore seeds as well as fruits with casings can be made durable. All from coarse material are ground finely before the treatment or worked on otherwise in appropriate cutting up and mixing machines. The kind of the usable fillers, which are used in quantities from approximately 0.5 to 5 0%, related to fruit and/or Gemüsepulver, can be very verschieden. There with the available procedure, in order möglichst natural high-quality products too received, foreign matter to exclude to a large extent are, as fillers natural and halbnatural fillers are used. As examples are, without giving a delimitation, mentioned: Vegetable powder, fruit powder, e.g. Hagebutterpulver, Johannisbrotmehl, pektine, Tragantstoffe, Icelandic, furthermore Alginate. The products after available invention können versatile application in preparing of Speise finden, especially is pointed to the use during ice cream production and for milk beverages. In addition, the relationship of honey and Invertzucker amounts to under normal conditions about 1:1, can deviate something from each other. The quantities the verriebenen fruit and vegetable masses of added mixture from honey and Invertzucker can vary within a wide range, one must only ensure that all parts of the fruits or the vegetable are well enclosed by this mass. During mixing it is not necessary, when grinding or grinding the fruits and the vegetable separating liquid mixes itself to separate. One can pensieren these, how already he wähnt, if necessary by suitable fillers kommen. Grinding and grinding of Früchten and vegetables happen as finely as possible, in usual highly effective cut up and mix machines. Examples 1. Rubbed carrots mixed in same Teil with a mixture from honey and Invertzucker and adjusted by additive of Citronensäure to a product with a pH value of approximately 3.2. 2. In the mixing vessel ever same parts Kokosfett and Sonnenblumenöl are mixed when easy warming up. The rubbed carrots (sellerie, radish) are to it-given and stirred carefully, until a around wrapping the individual fruit parts is obtained by the fat and Öl Mischung. Then slowly same parts of a syrup and a honey mixture become eingeagitate. 3. One mixes rubbed Meerrettich in same parts with a mixture from honey and in more Invertzucker, which do not hold any more than 8 to 10% water ent, and adjusts with Citronensäure to a pH value of approximately 3.4. 4. One mixes rubbed meerrettich with in more Invertzucker and a 10%igen vinegar solution and receives thereby a product with a pH value of approximately 3.3. 5. One mixes bananas with one with Citronen acid acidified emulsion from honey and Invert sugar in the mixing machine to a homogeneous mass. 6. One mixes meerrettich with an emulsion from glucose and Fruktose and hard Palmkernfett in the mixer and adjusts by acetic acid to a pH value of approximately 3.5. 7. Rubbed apple with honey and Fruktose under additive of tartaric acid are mixed and thus a product with a pH value of approximately 3.6 manufactured.

Claims OF DE1101118 of PATENT CLAIMS: 1. Procedure for the durable making of vegetable or fruits, by the fact characterized that one mixes and with a benefitable acid to a pH value from approximately 3 to 3.8 adjusts the ground or otherwise cut up Pflanzenteile with a mixture from honey and Invert sugar or its Monosaccharidkomponenten. 2. Procedure according to requirement 1, thus gekennzeichnet draws that one adds fats or Lipide. 3. Procedure according to requirement 1 and 2, by the fact characterized that one uses honey, Invertzucker and Lipide or fats in form of an aqueous Emulsion. 4. Procedure according to requirement 1 to 3, gekennzeichnet by the fact marks that one uses water-poor Invertzucker or its components, which

contains about 10 or fewer per cent water. Considered block letters: Danish patent specification No. 44268; USA patent specifications No. 2,505 \_ 746, 1877 641, 1906 295; German patent specification No. 809,882; German laying out writing No. 1038 715.





## AUSLEGESCHRIFT 1 101 118

Sch 25436 IVa/53 c

ANMELDETAG: 31. JANUAR 1959

BEKANNTMACHUNG

DER ANMELDUNG

UND AUSGABE DER

AUSLEGESCHRIFT: 2. MÄRZ 1961

## 1

Man hat bereits versucht, Inhaltsstoffe von Gemüse und Früchten, die leicht einer Änderung durch oxydative Einflüsse unterliegen, durch Honig oder Zuckerarten zu konservieren. Hierbei ist man vielfach von verdünnten Honiglösungen ausgegangen, aber zu keinem befriedigenden Ergebnis gekommen.

Gerade wenn es sich um hochempfindliche Gemüse oder Früchte handelt, sind die Lagerungsergebnisse unbefriedigend. Man erhält nach einiger Zeit Produkte, die in ihrem Geschmack verändert sind und daher nicht mehr dem völligen wirtschaftlichen Wert entsprechen. Besonders trifft dies zu, wenn es sich um Gemüse und Früchte handelt, bei denen gerade die Geschmackseigenschaften von besonderer Bedeutung sind. Zum Beispiel Meerrettich, junge Möhren oder auch Äpfel, die in geriebenem Zustand ihren vollen Gehalt an Aromastoffen und Geschmacksstoffen behalten sollen, lassen sich mit den bekannten Verfahren nicht ausreichend haltbar machen. Meerrettich wird schon nach wenigen Tagen in seinem Geschmack nachlassen und nach einigen Wochen fast geschmacklos sein.

Man hat schon Gemüse und Früchte mit Honig allein oder auch mit Honig und Zucker zu konservieren versucht oder auch z. B. Meerrettich mit Sauce allein konserviert. Immer läßt nach kurzer Zeit der Geschmack und das Aroma der Ware zu wünschen übrig, wenn überhaupt eine Haltbarkeit über längere Zeit erzielt wird.

Wenn man aber, wie das gemäß vorliegender Erfindung kennzeichnend ist, die Behandlung von Gemüse und Früchten mit Honig und Invertzucker bzw. einzelnen monomeren Zuckern dahin fortbildet, daß man Gemische von Honig und Invertzucker verwendet, in denen eine Komponente der monomeren Zuckerarten überwiegen kann, und außerdem den  $p_H$ -Wert auf etwa 3 bis 3,8 herabsetzt, so erzielt man einen außerordentlich überraschenden und sehr wertvollen Erfolg. Bei einer monatelangen Lagerung bleiben derartige Pflanzenteile, z. B. geriebener Meerrettich, vollständig frisch, und man hat eine Geschmacksempfindung wie bei unmittelbar vorher geriebenem Meerrettich. Ähnlicherweise lassen sich andere Gemüsearten, grüne Gemüse sowie auch Wurzelgemüse, auch Obst, insbesondere geriebene Äpfel, hinsichtlich ihres Gehaltes an Aroma- und Duftstoffen konservieren.

Diese Herabsetzung des  $p_H$ -Wertes (frischer Meerrettich zeigt einen  $p_H$ -Wert von etwa 4,1 bis 4,4) bedingt auch, daß die Enzymsysteme der behandelten Pflanzenteile intakt bleiben und beim Verzehr also voll zur Wirkung kommen können.

Das Herabsetzen des  $p_H$ -Wertes erfolgt zweckmäßig durch Zusatz geringer Mengen genußfähiger Säuren, z. B. organischer Säuren, obgleich, wenn anorganische Säuren, z. B. Salzsäure, nicht stören, das schwache

Verfahren zum Haltbarmachen  
von Gemüse und Früchten

Anmelder:

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Hannover-KirchrodeDr. Hans-Adalbert Schweigart, Hannover-Kirchrode,  
ist als Erfinder genannt worden

Der Miterfinder hat beantragt, nicht genannt zu werden

## 2

Ansäuern auch mit Hilfe von Salzsäure erfolgen kann. Vorzugsweise werden die sogenannten Genußsäuren, z. B. Citronensäure, Weinsäure, Apfelsäure, Milchsäure, Essigsäure, Ascorbinsäure, verwendet. Die Haltbarkeit kann weiter durch Zusatz von 1 bis etwa 6% Lipoiden erhöht werden. Die zugesetzten Mengen Invertzucker oder monomeren Zuckerarten sollen möglichst wasserarm sein. Während der gewöhnliche Invertzucker ungefähr 20% Wasser aufweist, werden für das vorliegende Verfahren bevorzugt solche Invertzuckerarten oder monomere Zucker verwendet, die wesentlich weniger, nämlich nur etwa 8 bis 10%, freies Wasser aufweisen. Es ist auch charakteristisch für das vorliegende Verfahren, daß man Gemische von Honig, der ja selber vorwiegend aus Invertzucker besteht, und Invertzucker und dessen Komponenten verwendet, weil man gerade dann die Möglichkeit hat, wie bereits erwähnt, die einemonomere Zuckerkomponente, z. B. die der Glukose, in einem Überschuß gegenüber der anderen monomeren Zuckerkomponente zu halten. Meerrettich und ähnliche Pflanzenteile sind weder mit Fett noch mit Honig allein haltbar, wohl aber mit Fett und Honig bei gleichzeitiger  $p_H$ -Korrektur, z. B. mit Citronensäure. Fett überzieht die reaktionsfähigen Partikelchen der mit Sirup oder Honig stabilisierten Enzymsysteme und schützt wahrscheinlich durch Bildung von Anlagerungsprodukten die Aromastoffe der Früchte und Gemüse.

Die Durchführungsweise der vorliegenden Erfindung ist vielfacher Variationen fähig, z. B. kann man den Invertzucker aus Rohr- oder Rübenzucker durch Invertierung mit einer Genußsäure, z. B. Citronensäure oder Milchsäure oder auch Citronensaft, herstellen und

unmittelbar die saure Invertzuckerlösung nach Vermischen mit Honig zum Behandeln der Früchte und Gemüse verwenden. Auch kann man Honig, Invertzucker, Lipide und Säure in einer gemeinsamen wäßrigen Emulsion zur Anwendung bringen, oder man kann auch das Gemüse oder die Früchte in zerriebener Form zunächst mit einer Lipidemulsion (Fette und/oder Öle, Lecithine) vermischen und dann die Behandlung mit dem Honig-Invertzucker-Gemisch und die Einstellung des  $p_H$ -Wertes auf etwa 3 bis 3,8 vornehmen.

Nach einer weiteren Ausführungsform der Erfindung kann man gleichzeitig oder anschließend absorbierende Füllstoffe zusetzen, die dann das Aroma und die Geschmacksstoffe der Gemüse und Früchte ganz besonders gut zur Wirkung kommen lassen.

Es sei noch erneut betont, daß das vorliegende Verfahren für eine Vielzahl von Früchten und Gemüsen anwendbar ist. Als Früchte kommen solche aller Art in Betracht. Als Beispiele seien neben Äpfel und Birnen vor allem auch Bananen erwähnt.

Das vorliegende Verfahren kann man auf Gemüse, z. B. Wurzelgemüse, wie Möhren, Rettich, Meerrettich, Knollengemüse, z. B. Sellerie, Kartoffeln, Rhizomgemüse, wie Topinambur, Hypokotyle, wie Spargel, ferner auf Blattgemüse, wie Spinat, als Ausgangsstoffe verwenden. Ferner können Samen sowie Früchte mit Umhüllungen haltbar gemacht werden. Alle Ausgangsstoffe werden vor der Behandlung fein zerrieben oder anderweitig in entsprechenden Zerkleinerungs- und Mischmaschinen bearbeitet.

Die Art der verwendbaren Füllstoffe, die in Mengen von etwa 0,5 bis 5%, bezogen auf Frucht- bzw. Gemüsepulver, angewendet werden, kann sehr verschieden sein. Da beim vorliegenden Verfahren, um möglichst natürliche hochwertige Erzeugnisse zu erhalten, Fremdstoffe weitgehend auszuschließen sind, werden als Füllstoffe natürliche und halbnatürliche Füllstoffe verwendet. Als Beispiele seien, ohne eine Begrenzung zu geben, genannt: Gemüsepulver, Obstpulver, z. B. Hagebuttenpulver, Johannisbrotmehlpulver, Pektine, Tragantstoffe, Isländisches Moospulver, ferner Alginate.

Die Erzeugnisse nach vorliegender Erfindung können vielseitige Anwendung in der Bereitung von Speisen finden, insbesondere sei auf die Verwendung bei Eiscremherstellung und für Milchgetränke hingewiesen.

Das Verhältnis von Honig und Invertzucker beträgt im Normalfall etwa 1:1, kann aber auch etwas voneinander abweichen. Die Mengen des den verriebenen Obst- und Gemüsemassen zugesetzten Gemisches aus Honig und Invertzucker können in weiten Grenzen schwanken, man muß nur dafür sorgen, daß alle Teile der Früchte oder des Gemüses von dieser Masse gut umschlossen werden. Bei dem Vermischen ist es nicht notwendig, sich beim Zerreiben oder Zermahlen der Früchte und des Gemüses abscheidende Flüssigkeitsmengen abzutrennen. Man kann diese, wie bereits erwähnt, gegebenenfalls durch geeignete Füllstoffe kompensieren. Die Zerreibung und Zermahlung von Früchten und Gemüsen geschieht möglichst fein, und zwar

in üblichen hochwirksamen Zerkleinerungs- und Mischmaschinen.

### Beispiele

1. Geriebene Möhren werden in etwa gleichen Teilen mit einem Gemisch aus Honig und Invertzucker gemischt und durch Zusatz von Citronensäure auf ein Produkt mit einem  $p_H$ -Wert von etwa 3,2 eingestellt.

2. Im Mischgefäß werden je gleiche Teile Kokosfett und Sonnenblumenöl bei leichtem Erwärmen gemischt. Die geriebenen Mohrrüben (Sellerie, Rettich) werden dazugegeben und vorsichtig eingerührt, bis eine Umhüllung der einzelnen Fruchtteile durch die Fett- und Ölmischung erzielt wird. Dann werden langsam etwa gleiche Teile eines Sirup- und Honiggemisches eingerührt.

3. Man vermischt geriebenen Meerrettich in etwa gleichen Teilen mit einem Gemisch aus Honig und Invertzucker, der nicht mehr als 8 bis 10% Wasser enthält, und stellt mit Citronensäure auf einen  $p_H$ -Wert von etwa 3,4 ein.

4. Man vermischt geriebenen Meerrettich mit Invertzucker und einer 10%igen Weinessiglösung und erhält dadurch ein Produkt mit einem  $p_H$ -Wert von etwa 3,3.

5. Man vermischt Bananen mit einer mit Citronensäure angesäuerten Emulsion aus Honig und Invertzucker in der Mischmaschine zu einer homogenen Masse.

6. Man vermischt Meerrettich mit einer Emulsion aus Glukose und Fruktose und hartem Palmkernfett im Mischer und stellt durch Essigsäure auf einen  $p_H$ -Wert von etwa 3,5 ein.

7. Geriebene Äpfel werden mit Honig und Fruktose unter Zusatz von Weinsäure gemischt und dadurch ein Produkt mit einem  $p_H$ -Wert von etwa 3,6 hergestellt.

### PATENTANSPRÜCHE:

1. Verfahren zum Haltbarmachen von Gemüse oder Früchten, dadurch gekennzeichnet, daß man die zerriebenen oder anderweitig zerkleinerten Pflanzenteile mit einem Gemisch aus Honig und Invertzucker oder dessen Monosaccharidkomponenten vermischt und mit einer genußfähigen Säure auf einen  $p_H$ -Wert von etwa 3 bis 3,8 einstellt.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß man Fette oder Lipide zusetzt.

3. Verfahren nach Anspruch 1 und 2, dadurch gekennzeichnet, daß man Honig, Invertzucker und Lipide oder Fette in Form einer wäßrigen Emulsion verwendet.

4. Verfahren nach Anspruch 1 bis 3, dadurch gekennzeichnet, daß man wasserarmen Invertzucker oder dessen Komponenten, die etwa 10 oder weniger Prozent Wasser enthalten, verwendet.

In Betracht gezogene Druckschriften:

Dänische Patentschrift Nr. 44 268;

USA.-Patentschriften Nr. 2 505 746, 1 877 641, 1 906 295;

deutsche Patentschrift Nr. 809 882;

deutsche Auslegeschrift Nr. 1 038 715.



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(54) Jams treated at high pressure.

(57) Jams including jellies, preserves, purees, fruit sauces and the like obtained by subjecting a mixture of raw materials to a high pressure treatment without heating is disclosed. The high pressure treatment is conducted at room temperature and a pressure of 500 to 10,000 kg/cm<sup>2</sup> for 1 to 1,800 minutes.

EP 0 429 966 A2

**JAMS TREATED AT HIGH PRESSURE**FIELD OF THE INVENTION

5 The present invention relates to food, particularly, fruit products treated at a high pressure. More particularly, it relates to jams including jellies, preserves, purees, fruit sauces and the like obtained by a treatment at high pressure, which maintain color and taste of fresh fruits used as raw materials.

BACKGROUND OF THE INVENTION

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It has been found that, when food is held at a high pressure such as several thousands atm., denaturation of protein as well as inactivation and death of microorganisms can be caused, and hence, various trials for employing such a high pressure treatment as cooking, processing and storing means of food have been made.

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However, a heat treatment has been widely employed as cooking, processing and storing means of food, and no food product which is obtained by successfully employing such a high pressure treatment in place of a heat treatment and can be marketed is not yet found.

OBJECTS OF THE INVENTION

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Under these circumstances, in order to put a high pressure treatment of food to practical use, the present inventors have intensively studied. As a result, it has been found that such a treatment is suitable for the production of processed fruit products, particularly, jams including jellies, preserves, purees, fruit  
25 sauces and the like, and a product maintaining color and taste of fresh fruits which can be marketed can be obtained without conducting the conventional heat treatment which has hitherto been considered to be essential to the production of jams and the like.

That is, the main object of the present invention is to provide jams obtained by treatment at a high pressure without the conventional heat treatment.

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This object as well as other objects and advantages of the present invention will become apparent to those skilled in the art from the following description.

SUMMARY OF THE INVENTION

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According to the present invention, there is provided jams obtained by subjecting a mixture of raw materials to a high pressure treatment without heating. According to the present invention, when a mixture of raw materials is subjected to a high pressure treatment under predetermined conditions, permeation of a solution of sugar into fruits as well as sterilization can be conducted simultaneously, and it is not necessary  
40 to conduct the conventional heat treatment at all. Thus, novel jams maintaining color and taste of fresh fruits can be obtained.

DETAILED DESCRIPTION OF THE INVENTION

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The jams of the present invention includes jams jellies, preserves, marmalades, purees, fruit sauces, fruit butters and the like.

The raw materials used in the present invention are not specifically limited and they may be the conventional raw materials which are normally used, for example, various fruits, juice, sugars, acidulants,  
50 other additives (i.e., pectin, vitamin C). Further, the amount of each raw material in a mixture of raw materials is not specifically limited and any conventional formulation can be employed.

In order to produce the jams of the present invention, firstly, a mixture of raw materials obtained by mixing the desired raw materials according to the conventional manner is filled in a desired container for marketing which can be externally pressurized such as a flexible plastic container or the like. After sealing of the container, it is subjected to a high pressure treatment at room temperature and a pressure of 500 to

10,000 kg/cm<sup>2</sup>, preferably 4,000 to 6,000 kg/cm<sup>2</sup> for 1 to 1,800 minutes, preferably 1 to 30 minutes. This high pressure treatment can be conducted by using a known pressurizing apparatus by applying a pressure with a pressurized fluid such as air, water or the like. When the pressure is too low and the time of treatment is too short, the desired effect is scarcely obtained. On the other hand, excessive high pressure and treatment for a long period of time are not preferred from the viewpoint of workability and economy.

Besides, fruit peels used for the production of marmalades are normally pre-treated by heating. However, it has also been found that such a pre-treatment can be conducted by a high pressure treatment under the same conditions in place of the conventional heating. For example, fresh fruit peels are sliced in a suitable size and mixed with an aqueous citric acid solution and the mixture is placed in a flexible container. Then, the container is sealed and it is subjected to a high pressure treatment according to the same manner as that described above. The peels thus obtained can be used according to the same manner as that obtained by the conventional heat treatment.

The jams of the present invention can be used as the conventional jams to enjoy color and taste of fresh fruits. In addition, in order to maintain fresh color and taste, it is preferred that the jams of the present invention is marketed through a chilled route.

The following Examples further illustrate the present invention in detail but are not to be construed to limit the scope thereof.

#### EXAMPLE 1

Strawberry jam	
Ingredients	% by weight
Strawberry (dehulled, washed with water)	50
Sugar	36.3
Citric acid	0.15
Vitamin C	0.1
Pectin	0.5
Water	12.95

According to the above formulation, the ingredients were mixed and the mixture was placed in plastic containers without heating. After sealing of the containers, they were placed in a high pressure treatment apparatus and pressurized at 4000 kg/cm<sup>2</sup> for 15 minutes to obtain the desired preserve style strawberry jam of 40° Brix.

#### EXAMPLE 2

Orange marmalade	
Ingredients	% by weight
Pre-treated orange peels	25
Orange pulp	30
Sugar	31.5
Citric acid	0.35
Vitamin C	0.2
Pectin	0.4
Water	12.55

According to the same manner as that described in Example 1, a mixture of the raw materials was subjected to a high pressure treatment to obtain the desired orange marmalade of 35° Brix. The orange

peels used were pre-treated as follows.

After fresh fruits were washed with water, peels were removed and sliced in a suitable size. Then, they were dipped in an 50 mg% aqueous vitamin C solution and the sliced peels were washed with water. They were drained off and mixed with an 2% aqueous citric acid solution in the weight ratio of 1 : 1. After they were placed in flexible containers and sealed, a high pressure treatment was conducted out according to the same manner as that described above. The pre-treated orange peels thus obtained were further washed with water and drained off. Then, they were used for the production of the above marmalade.

Taste of various jams thus obtained (products of the present invention) and that of jams obtained by the conventional heat treatment (the conventional products) were compared by using 30 panelists according to a two-point comparison method. The results are shown in Table 1.

Table 1

Jams	Number of panelists who judged that the conventional jam is better	Number of panelists who judged that the jam of the present invention is better
Strawberry	6	24
Kiwi	6	24
Fig	2	28
Orange marmalade	5	25
Grapefruit marmalade	1	29
Apple	9	21
Peach (white)	2	28

As seen from Table 1, the jams of the present invention have excellent taste and flavor in comparison with the conventional jams subjected to a heat treatment.

### Example 3

Fruit sauce (strawberry)	
Ingredients	% by weight
Strawberry (dehulled, washed with water)	50
Sugar	36.3
Citric acid	0.15
Vitamin C	0.1
Pectin	0.1
Water	13.35

According to the above formulation, the ingredients were mixed and the mixture was placed in plastic containers without heating. After sealing of the containers, they were placed in a high pressure treatment apparatus and was pressurized at 4000 kg/cm<sup>2</sup> for 10 minutes to obtain the desired fruit sauce of strawberry of 40° Brix.

Taste of various fruit sauces thus obtained (the products of the present invention) and that of fruit sauces obtained by the conventional heat treatment (the conventional product) were compared by using 30 panelists according to two-point comparison method. The results are shown in Table 2.

Table 2

5	Fruit sauces	Number of panelists who judged that the conventional fruit sauce is better	Number of panelists who judged that the fruit sauce of the present invention is better
	Strawberry	4	26
	Kiwi	5	25
	Fig	1	29
	Blueberry	6	24
10	Apple	5	25
	Peach (white)	3	27

15 As seen from Table 2, the fruit sauces of the present invention have excellent taste and flavor in comparison with the conventional fruit sauces subjected to a heat treatment.

#### Claims

- 20 1. Jams obtained by subjecting a mixture of raw materials to a high pressure treatment without heating.
2. Jams according to claim 1, wherein the high pressure treatment is conducted under the conditions of a temperature at room temperature and a pressure of 500 to 10,000 kg/cm<sup>2</sup> for 1 to 1,800 minutes.
- 25 3. Jams according to claim 2, wherein the high pressure treatment is conducted at a pressure of 4,000 to 6,000 kg/cm<sup>2</sup> for 1 to 30 minutes.

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(54) **Jams treated at high pressure.**

(57) Jams including jellies, preserves, purees, fruit sauces and the like obtained by subjecting a mixture of raw materials to a high pressure treatment without heating is disclosed. The high pressure treatment is conducted at room temperature and a pressure of 500 to 10,000 kg/cm<sup>2</sup> for 1 to 1,800 minutes.

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	FOOD TECHNOLOGY, vol. 43, no. 3, March 1989, pages 99-107, Chicago, Illinois, US; D.G. HOOVER et al.: "Biological effects of high hydrostatic pressure on food microorganisms" * Page 103, table 2, under "Applications in Food Preservation"; pages 105,100; page 104, table 3 *	1-3	A 23 L 1/064 A 23 L 3/015
A	FR-A-2 442 018 (BURTON-CORBLIN) * Page 1, lines 1-3,33-35,6-29; page 2, lines 14-16; page 3, line 4; claim 1 *	2,3	
A	PATENT ABSTRACTS OF JAPAN, vol. 6, no. 135 (C-115), 22nd July 1982; & JP-A-57 058 864 (QP CORP.) * Abstract *	1	
A	US-A-2 459 431 (G. JOHNSON et al.) * Column 2, lines 19-27; claim 1 *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A 23 L
The present search report has been drawn up for all claims			
Place of search		Date of completion of search	Examiner
The Hague		30 October 91	KANBIER D.T.
<b>CATEGORY OF CITED DOCUMENTS</b> X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons &: member of the same patent family, corresponding document			

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(54) **Process and plant for enzymatic inactivation subsequent to the extraction of puree from food products**

Anlage und Verfahren zur enzymatischen Inaktivierung nach der Gewinnung von Püree aus Nahrungsmitteln

Installation et procédé pour l'inactivation enzymatique après l'extraction de la purée à partir de produits alimentaires

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**GB-A- 1 339 939** **US-A- 4 543 879**  
**US-A- 4 670 281** **US-A- 5 171 598**

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Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

## Description

[0001] The present invention concerns a process and a plant for enzymatic inactivation relating to the extraction of purée from food products. The term purée means the pulp of the product in a substantially creamy condition, and then not into pieces, obtained through a strainer which removes the waste matter from the product.

[0002] At present, in order to extract purée from food products, generally the product is cold-crushed and then heated with the aim of achieving enzymatic inactivation of the crushed matter which then passes into a strainer or refiner for separating the purée from the waste matter (skins, seeds, stalks, etc.).

[0003] When, owing to the particular chemical composition of the processed fruit, there are no significant phenomena involving oxidation, change in colour or separation of liquid parts from solid parts, or when the purée itself is intended for uses where the consistency, colour and separation of solid from liquid are of no importance, in such cases it is possible to perform cold extraction (at room temperature) without any particular precautions during the ensuing heating stage.

[0004] In the case, however, of the cold extraction of purée from apples or similar products (such as pears, apricots and peaches, for example) or from products where the loss of consistency, oxidation and separation of solid parts from liquid parts are undesirable phenomena which are to be avoided at all costs, it is necessary to perform enzymatic inactivation immediately in order to avoid such phenomena produced by the pectolytic enzymes.

[0005] Cold extraction of the purée ensures optimum quality of the product obtained, and the plant which performs the enzymatic inactivation heat-treatment after extraction must reduce to a minimum the harmful effects (browning, change in taste, etc.) of the high-temperature exposure period on the fresh purée.

[0006] At present the plants used for enzymatic inactivation of crushed fruit (and not purée) are also used for the enzymatic inactivation of the cold-extracted purée, but said plants are not suitable for avoiding the abovementioned harmful effects since they are expressly designed so as to ensure long heat exposure of the product within the plant so that the heat is able to reach the centre of the crushed parts.

[0007] In particular said heating is performed by means of a screw with direct steam injection, or with a rotating coil, or by means of a plant of the "pipe-in-pipe" type (in which the product to be heated passes inside one pipe and the heating fluid passes inside the other one, with considerable slowness of the heating process), or else with recirculation of the product within pipe bundles involving the use of a rest tank for heat exposure, in accordance with the configurations schematically illustrated in Figure 1, which also shows a pipe connecting pipe bundle G and tank F and another pipe on

which there are located the inlet and the outlet for the product, a circulation pump H and the instruments necessary for monitoring the process. With said tank, which is kept at atmospheric pressure or under a slight vacuum to promote evaporation of a small part of liquid present in the crushed fruit, it is possible to obtain enzymatic inactivation and high yields during the following purée extraction stage.

[0008] The product enters the recirculation plant (in which there is a pipe bundle where heating takes place) and is mixed by a centrifugal pump, the mechanical action of which, however, may cause an undesirable reduction in the consistency of the purée.

[0009] It is also necessary to have an extraction pump in order to transfer the heated purée to the next stage.

[0010] From IT 1165757 a process and a plant are known for an enzymatic deactivation of chopped product in which the chopped product is introduced into a pressurized and heated (up to over than 100°C) recirculation circuit.

[0011] The drawback is the high temperature and the exposure of the product to high temperatures in the pressurized tank.

[0012] In addition to the drawback of the long periods of heat exposure of the product, a further drawback is due to the fact that the traditional plants have stations which are separate and often distant from one another for performing extraction of the purée and carrying out enzymatic inactivation.

[0013] Moreover, in traditional plants, after the strainer there is arranged a purée storage tank for supplying a pump which transfers the purée to the plant. This provides the production line with the necessary flexibility since the purée extraction stage and enzymatic inactivation stage are rendered independent to a certain extent by the presence of the tank with the functions of a storage lung. This storage inside the tank is, however, extremely damaging since the purée is at room temperature, the enzymes are active and there is the risk of rapid degradation of the product with gradual oxidation (due to the air which is incorporated during extraction), change in colour and loss of consistency. Moreover, in order to limit these phenomena, use must be made of a significant quantity of inert gas with obvious additional costs, or anti-oxidizing solutions which are also costly and are not liked by the manufacturers of high-quality purée without chemical additives, which is typically used for baby food. A plant of known type is shown in US-A-5,999,876 which relates to a plant working with minced product and not purée and using necessarily intermediate tanks or zones in which the product is in direct contact with free air.

[0014] The object of the present invention is to eliminate the aforementioned drawbacks and provide a process and a plant which allow cold-extraction of the purée using a simplified enzymatic inactivation process which reduces to a minimum the heat exposure of the product, leaving the latter as natural as possible.

[0015] A further object is to avoid the use of the rest tank for heat exposure, the storage tank and the extraction pump.

[0016] Said objects are fully achieved by the process and the plant which form the subject of the present invention and which are characterized by the contents of the claims indicated below and in particular by the fact that the process involves a circulation of the purée in a recirculation circuit kept full in such a way as the product is never in direct contact with environments containing air, steam or gas.

[0017] The quantity of purée emerging from the recirculation circuit at the enzymatic inactivation temperature is therefore exactly equal to the quantity of purée entering at room temperature into the recirculation circuit, no intermediate storage tank being present, nor tank in which the product is exposed to high temperature.

[0018] The purée which emerges at room temperature from the strainer is conveyed by a pump into the plant recirculation circuit entirely filling it.

[0019] The plant preferably comprises two heat exchangers between which a lobe pump operates and the pipe sections for connecting the heat exchangers are overall less than about 3 m and are preferably between 2 m and 3 m.

[0020] These and other characteristic features will emerge more clearly from the following description of two preferred embodiments illustrated, purely by way of a non-limiting example, in the accompanying plates of drawings, in which:

- Figure 1 shows schematically a plant according to the prior art comprising the following components:

- A) crusher
- B) strainer
- C) a refiner (if applicable)
- D) tank for storing the purée at room temperature
- E) supply pump
- F) heat exposure tank
- G) pipe bundle
- H) centrifugal circulation pump
- I) extraction pump

- Figure 2 shows the plant according to the present invention;
- Figure 3 is a detail of the plant according to Figure 2, showing a device for mixing hot product with cold product;
- Figure 4 illustrates a variation of embodiment of a detail of the plant according to Figure 2;
- Figure 5 illustrates a further variation of embodiment of the plant.

[0021] With reference to Figures 2 and 3, 1 denotes in its entirety a plant for the extraction of purée from food

products, and more particularly from apples, peaches, pears, apricots and similar fruit, in which the purée is subject to the activity of pectolytic enzymes or in any case to oxidation and browning phenomena.

[0022] A conveyor 2 conveys the food product into a hopper 3 for introduction into a cold-type softening/straining assembly 4, for example of the type described in the Industrial Patents. IT 1,249,363 and IT 1,199,392, which allow the conversion of the whole fruit into purée in a few seconds.

[0023] The strainer directly discharges the purée into a volumetric pump 5 supplying a recirculation circuit 6 which contains a circulation pump 7 of the lobe type which exerts a very delicate pumping action on the processed product and is intended to convey the purée into a heat exchanger 8 of a substantially conventional type, in which the purée is subject to a rapid heating action (of the order of a few tenths of seconds) up to a temperature of about 80-100°C, sufficient to obtain enzymatic inactivation.

[0024] The heat exposure is very brief and the pipes used in the plant have a small diameter (of between 100 mm and 200 mm) and this makes it possible to avoid changes in the organoleptic properties of the purée due to standing at a high temperature for a long period of time.

[0025] Mixing of the hot purée, circulating inside the circuit 6, with the purée at room temperature supplied by the supply pump 5, is performed by means of a device 9 which is illustrated in greater detail in Figure 3 and which allows the temperature of the fresh purée to be brought up rapidly to that of the hot recirculation purée, necessary for correct operation of the plant.

[0026] The device 9 is designed such that the duct 10 supplying the purée at room temperature emerges into the recirculation circuit 6 with a tube portion which is closed at the end, but provided with a plurality of holes 11 on its side surface and arranged with the last section in the same direction as that of the recirculation circuit at that point.

[0027] The purée inside the entire recirculation circuit 6 may be kept at a pressure of about 1.5 to 4 bar, namely at a pressure greater than atmospheric pressure, but the purée may also be kept at atmospheric pressure or less.

[0028] The plant 1 according to Figure 2 comprises a counter-pressure device consisting of a counter-pressure valve 12 which balances the pressure provided by the pump 5 supplying the purée.

[0029] This valve, provided with an adjusting spring 13, is positioned on a purée outlet pipe 14, via which the purée passes into a tank schematically indicated by 15.

[0030] According to a variation of embodiment illustrated in Figure 4, the counter-pressure device is formed simply by raising the purée outlet pipe 14 in order to make use of the hydrostatic head of the purée. In this case the pipe 14 may be of the telescopic type in order to allow adjustment of the hydrostatic effect.

[0031] The duct 10 and the recirculation circuit 6, in

an original manner, are always completely filled with purée and there are no free-surface zones or tanks where the product is subject to oxidation.

[0032] The introduction of purée at room temperature through the duct 10 causes the automatic outflow, from the plant, of an equal quantity of hot purée inactive from the point of view of enzymes.

[0033] The plant is very compact and has small dimensions since the softening/straining assembly 4 which performs extraction of the purée is located directly above the suction pipe of the lobe pump 7 which performs recirculation, so as to obtain rapid and almost immediate conversion from the whole product to the hot purée at the enzymatic inactivation temperature, which avoids possible deterioration of the product by the enzymes.

[0034] To ensure that all the purée emerging from the strainer reaches immediately a high temperature or in any case a temperature sufficient for enzymatic inactivation, without intermediate exposure periods, it is envisaged that supply of the whole product into the strainer is able to occur only if the corresponding quantity of purée is able to emerge from the plant, at the inactivation temperature.

[0035] In fact, between the stage of introduction of the whole product into the strainer and the stage involving outflow of the purée from the plant 1 there is no possibility of intermediate storage of the product, no tanks or other storage means being provided, precisely in order to ensure the optimum quality of the product and avoid degradation thereof.

[0036] With particular reference to the variation of embodiment illustrated in Figure 5, said embodiment has the purpose of reducing to a minimum the periods of heat exposure of the product by effecting a further reduction in the volume of the plant (a first reduction with respect to the prior art is that provided by the original plant of Figure 2 where the rest tank envisaged in the solutions of the prior art has been eliminated) and in particular a reduction in the length of the pipes used.

[0037] This variation comprises two heat exchangers 8 (instead of only one as in the case of Figure 2) in order to reduce the "inert" pipe section of the recirculation circuit 6, which has a maximum extension lengthwise of about 2 - 3 m.

[0038] The geometry of the plant and the arrangement of its components play a particularly role in reduction of the volumes and enhance the characteristics of the plant itself: doubling of the pipe bundle 8 ensures that the length of the connection pipes is reduced to two short tube portions, one of which contains the lobe pump, while the other one contains the mixer with the inlet and the recirculation outlet 14.

[0039] A further reduction in the pipes is not possible since it is necessary to set aside space for the insertion of the process monitoring instruments, such as for example the temperature probes, pressure sensors and safety valves. In the plant according to Figure 5 the "in-

ert" sections, i.e. the piping sections which serve only for transfer of the purée, have therefore been eliminated.

[0040] Via the outlet pipe 14 the product passes into a deaeration/evaporation tank 15a (which removes the air trapped in the product) and is then conveyed by a pump 16 again into the recirculation circuit 6.

[0041] The product with a sufficient concentration, greater than a predetermined limit value, emerges from the plant through an outlet 17.

[0042] A refractometer 18 measures the concentration in order to operate a pneumatic valve 19 regulated by a spring 13a. In the recirculation circuit the lobe pump 7, located between the two pipe bundles of the exchangers 8, serves to provide a recovery in the pressure of the product, while the heat exchanger provides a temperature recovery. Normally, in fact, immediately upstream of the mixing device 9 the temperature is about 95° C, which drops to about 80° C immediately downstream thereof owing to the introduction of fresh product supplied from the strainer 4.

[0043] The particular arrangement of the exchangers 8 and the lobe pump 7 improves the performance characteristics of the plant.

[0044] The present plant is specific for the treatment of purée (the plant being after the strainer) and not for chopped product or product into pieces. The elements of the plant (ducts of a small section, the device 9, and the valves) are not suitable for the treatment of chopped product or of product into pieces.

## Claims

1. A process for enzymatic inactivation subsequent to the extraction of purée from food products, in which extraction of the purée is performed at room temperature, followed by heating of the extracted purée in a recirculation circuit (6) at a temperature such as to obtain enzymatic inactivation of the purée, the recirculation circuit (6) being provided with at least a pipe bundle (8), comprising the step of circulating the purée in the recirculating circuit (6) kept full of the purée **characterized in that** there is a spontaneous automatic outflowing of a quantity of purée from the recirculation circuit (6) at the enzymatic inactivation temperature equal to the quantity of purée entering at room temperature into the recirculation circuit (6), no storage intermediate tanks or heat exposure tanks being provided in said recirculation circuit (6).
2. A plant for enzymatic inactivation subsequent to the extraction of purée from food products, of the type comprising a strainer (4) which receives the whole or preprocessed and softened product and extracts purée therefrom in order to supply a recirculation circuit (6) in which the purée is introduced and cir-

culates at a temperature such as to cause enzymatic inactivation, **characterized in that** the recirculation circuit (6) is shaped in such way as to be constantly full of purée, and to have a spontaneous automatic outflowing of a quantity of purée at the enzymatic inactivation temperature equal to the quantity of purée entering at room temperature into the recirculation circuit.

3. A plant according to Claim 2, **characterized in that** it comprises a pump (5) which supplies the pure, emerging at room temperature from the strainer (4), into the recirculation circuit (6) through a device (9) for mixing the purée.
4. A plant according to Claim 2, wherein the recirculation circuit (6) comprises a lobe pump (7).
5. A plant according to Claim 3, **characterized in that** it comprises a device (9) for mixing the purée which is at room temperature and supplied from the strainer (4) by means of a supply duct (10), with the high-temperature purée circulating in the recirculation circuit (6), said device consisting of the duct (10) which emerges in the recirculation circuit (6) in the form of a tube portion closed at an end tube portion and provided with a plurality of holes (11) on its side surface, said end tube portion being arranged in the same direction as that of the recirculation circuit (6) in that section.
6. A plant according to Claim 2, wherein the recirculation circuit (6) is provided with two heat exchangers (8) between which a lobe pump (7) operates, the two heat exchangers (8) having pipe bundles.
7. A plant according to Claim 6, wherein pipe sections for connecting the heat exchangers (8) are overall less than 3 m.

#### Patentansprüche

1. Verfahren zur enzymatischen Inaktivierung nach der Gewinnung von Püree aus Nahrungsmitteln, bei dem das Püree bei Raumtemperatur gewonnen und das gewonnene Püree daraufhin in einem Zirkulationskreislauf (6) auf eine Temperatur erhitzt wird, bei der eine enzymatische Inaktivierung des Pürees stattfindet, wobei der Zirkulationskreislauf (6) mindestens ein Rohrbündel (8) aufweist und der Zirkulationskreislauf (6) beim Umlaufen des Pürees in demselben mit Püree gefüllt bleibt, **dadurch gekennzeichnet, dass** bei der enzymatischen Inaktivierungstemperatur eine bestimmte Menge von Püree automatisch spontan aus dem Zirkulationskreislauf austritt, die der bei Raumtemperatur in den Zirkulationskreislauf (6) eintretenden Menge von

Püree entspricht, wobei keine Behälter zur Zwischenlagerung oder Wärmebehandlung in dem Zirkulationskreislauf (6) vorgesehen sind.

2. Anlage zur enzymatischen Inaktivierung nach der Gewinnung von Püree aus Nahrungsmitteln, der Art umfassend einen Filter (4), der das ganze bzw. vorbehandelte und weich gemachte Produkt aufnimmt, daraus Püree gewinnt und einem Zirkulationskreislauf (6) zuführt, in den das Püree eingegeben wird und bei einer Temperatur umläuft, bei der sich eine enzymatische Inaktivierung einstellt, **dadurch gekennzeichnet, dass** der Zirkulationskreislauf (6) so ausgebildet ist, dass er ständig mit Püree gefüllt ist und bei der enzymatischen Inaktivierungstemperatur automatisch die gleiche Menge an Püree spontan austritt, die bei Raumtemperatur in den Zirkulationskreislauf eintritt.
3. Anlage nach Anspruch 2, **dadurch gekennzeichnet, dass** sie eine Pumpe (5) umfasst, die das bei Raumtemperatur aus dem Filter (4) austretende Püree über eine Vorrichtung zum Mischen des Pürees (9) dem Zirkulationskreislauf (6) zuführt.
4. Anlage nach Anspruch 2, bei dem der Zirkulationskreislauf (6) eine Drehkolbenpumpe (7) umfasst.
5. Anlage nach Anspruch 3, **dadurch gekennzeichnet, dass** sie eine Vorrichtung (9) zum Mischen des auf Raumtemperatur befindlichen, vom Filter (4) über eine Versorgungsleitung (10) zugeführten Pürees mit dem auf hoher Temperatur in dem Zirkulationskreislauf (6) umlaufenden Püree umfasst, wobei diese Vorrichtung aus der Leitung (10) besteht, die in Form eines an einem Endbereich geschlossenen Rohrbereiches in den Zirkulationskreislauf (6) mündet und auf ihrer Seitenfläche eine Vielzahl von Löchern (11) aufweist, wobei der genannte Endrohrbereich in derselben Richtung angeordnet ist, wie der Zirkulationskreislauf (6) in diesem Bereich.
6. Anlage nach Anspruch 2, bei der der Zirkulationskreislauf (6) zwei Wärmetauscher (8) aufweist, zwischen denen eine Drehkolbenpumpe (7) geschaltet ist, und die beiden Wärmetauscher (8) Rohrbündel aufweisen.
7. Anlage nach Anspruch 6, bei der die Rohrbereiche zur Verbindung des Wärmetauschers (8) sich insgesamt auf weniger als 3 m belaufen.

#### Revendications

1. Un procédé pour l'inactivation enzymatique après l'extraction de la purée à partir de produits alimentaires, dans lequel l'extraction de la purée est réa-

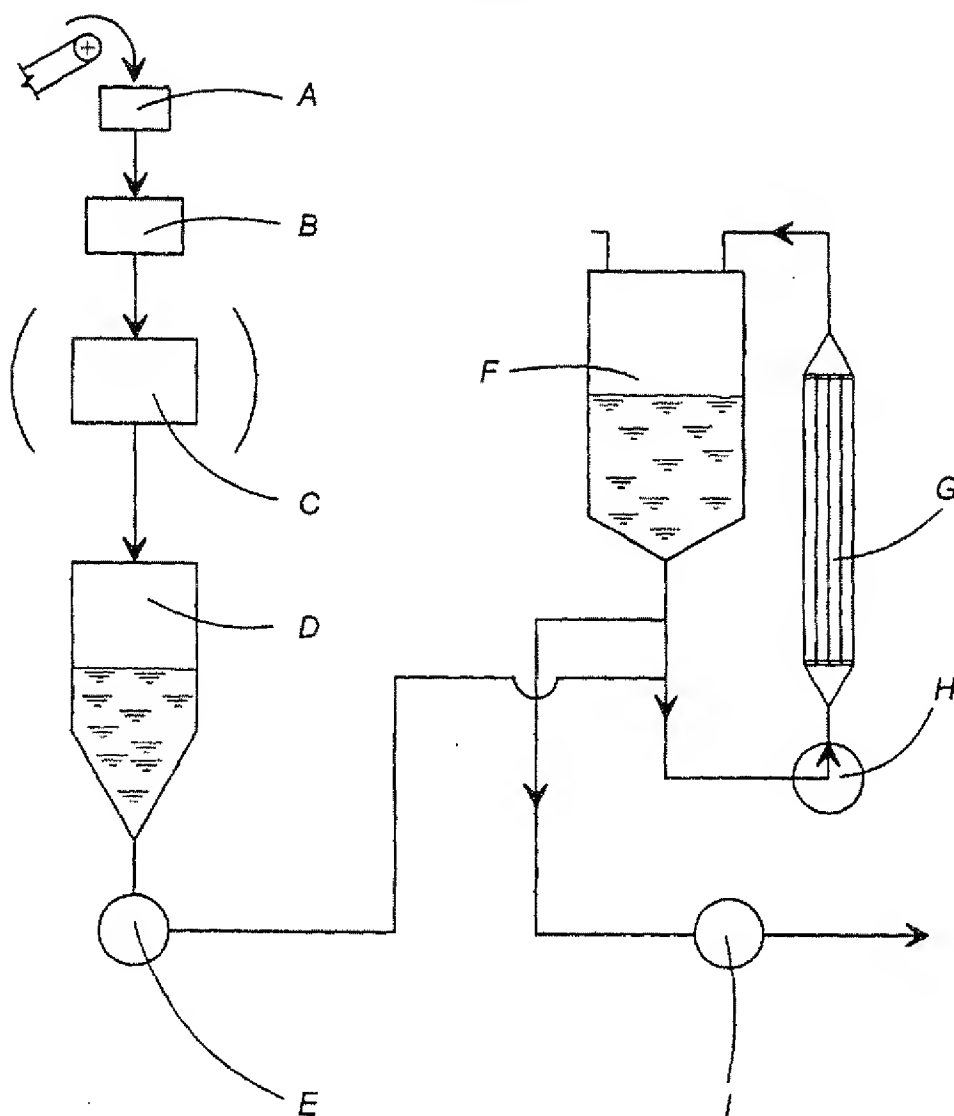
lisée à température ambiante, suivie d'un chauffage de la purée extraite dans un circuit de recirculation (6) à une température permettant d'obtenir l'inactivation enzymatique de la purée, le circuit de recirculation (6) étant pourvu d'au moins un faisceau de tubes (8), comprenant l'étape de circulation de la purée dans le circuit de recirculation (6) maintenu plein de purée, **caractérisé en ce que** se produit une sortie automatique spontanée d'une quantité de purée depuis le circuit de recirculation (6), à la température d'inactivation enzymatique, égale à la quantité de purée entrant, à température ambiante, dans le circuit de recirculation (6), aucun réservoir de stockage ou de chauffage n'étant prévu dans ledit circuit de recirculation.

2. Une installation pour l'inactivation enzymatique après l'extraction de la purée à partir de produits alimentaires, du type comprenant une passoire (4) qui reçoit le produit entier ou préparé et ramolli et en extrait une purée de manière à alimenter un circuit de recirculation (6) dans lequel la purée est introduite et circule à une température telle qu'elle cause l'inactivation enzymatique, **caractérisée en ce que** le circuit de récirculation (6) est conformé de manière à être constamment plein de purée et à présenter une sortie automatique spontanée d'une quantité de purée depuis le circuit de recirculation (6), à la température d'inactivation enzymatique, égale à la quantité de purée entrant, à température ambiante, dans le circuit de recirculation (6).
3. Une installation selon la revendication 2, **caractérisée en ce qu'elle** comprend une pompe (5) qui fournit la purée, émergeant à température ambiante de la passoire (4), dans le circuit de recirculation (6) au travers d'un dispositif (9) pour mélanger la purée.
4. Une installation selon la revendication 2, dans laquelle le circuit de recirculation (6) comprend une pompe à lobes (7).
5. Une installation selon la revendication 3, **caractérisée en ce qu'elle** comprend un dispositif (9) pour mélanger la purée à température ambiante et fournie par la passoire (4) au moyen d'un conduit d'alimentation (10), avec la purée à haute température circulant dans le circuit de recirculation (6), ledit dispositif consistant en un conduit (10) qui émerge dans le circuit de recirculation (6) sous la forme de la portion d'un tube fermé à une extrémité et pourvue d'une pluralité d'orifices (11) sur sa surface latérale, ladite extrémité de portion de tube étant disposée dans la même direction que celle du circuit de recirculation (6) dans cette section.
6. Un dispositif selon la revendication 2, dans lequel le circuit de recirculation (6) est pourvu de deux

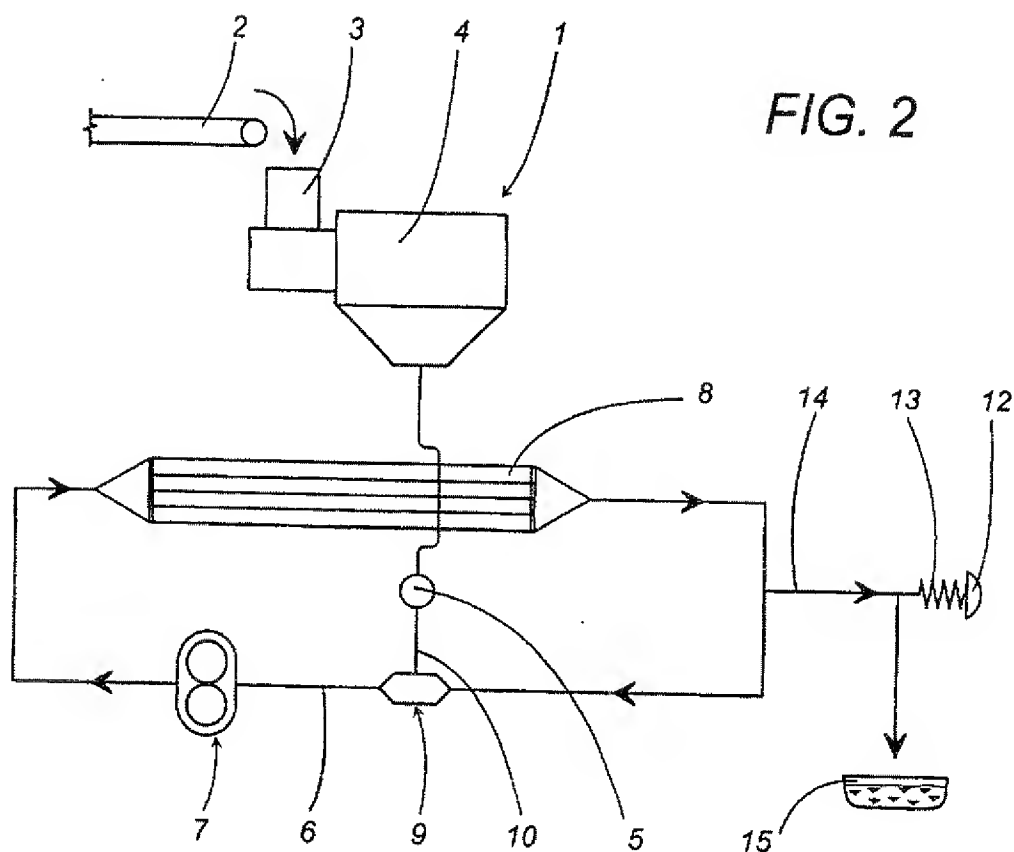
échangeurs de chaleur (8) entre lesquels opère une pompe à lobes (7), les deux échangeurs de chaleur (8) ayant des faisceaux de tube.

- 5 7. Une installation selon la revendication 6, dans laquelle des sections de tubes pour relier les échangeurs de chaleur (8) sont inférieures à 3 m.

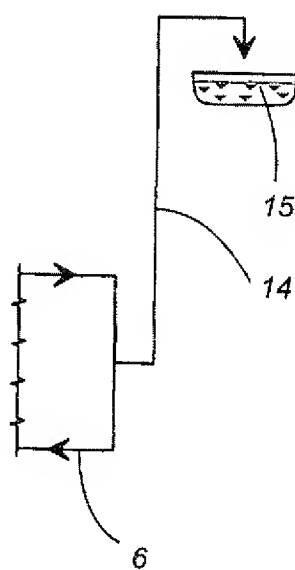
FIG. 1







**FIG. 4**



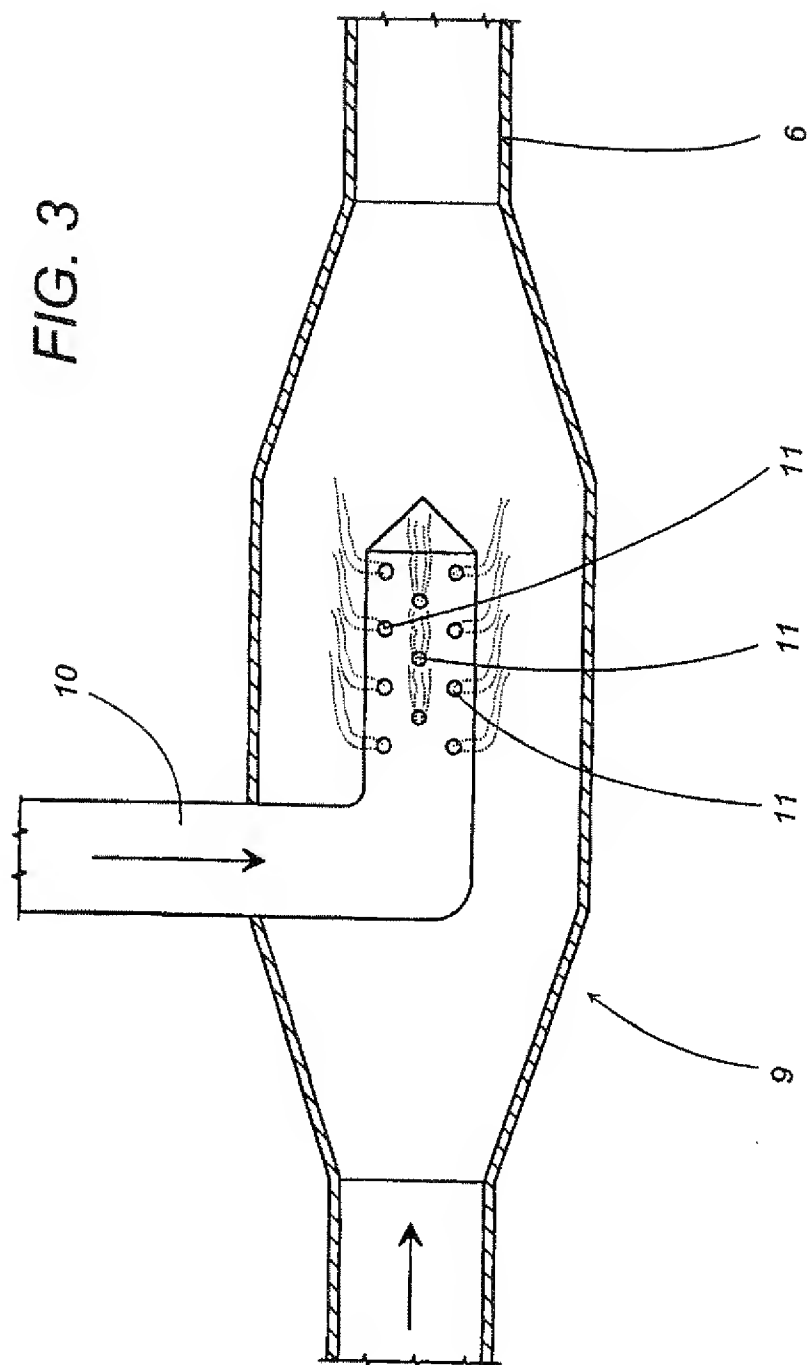
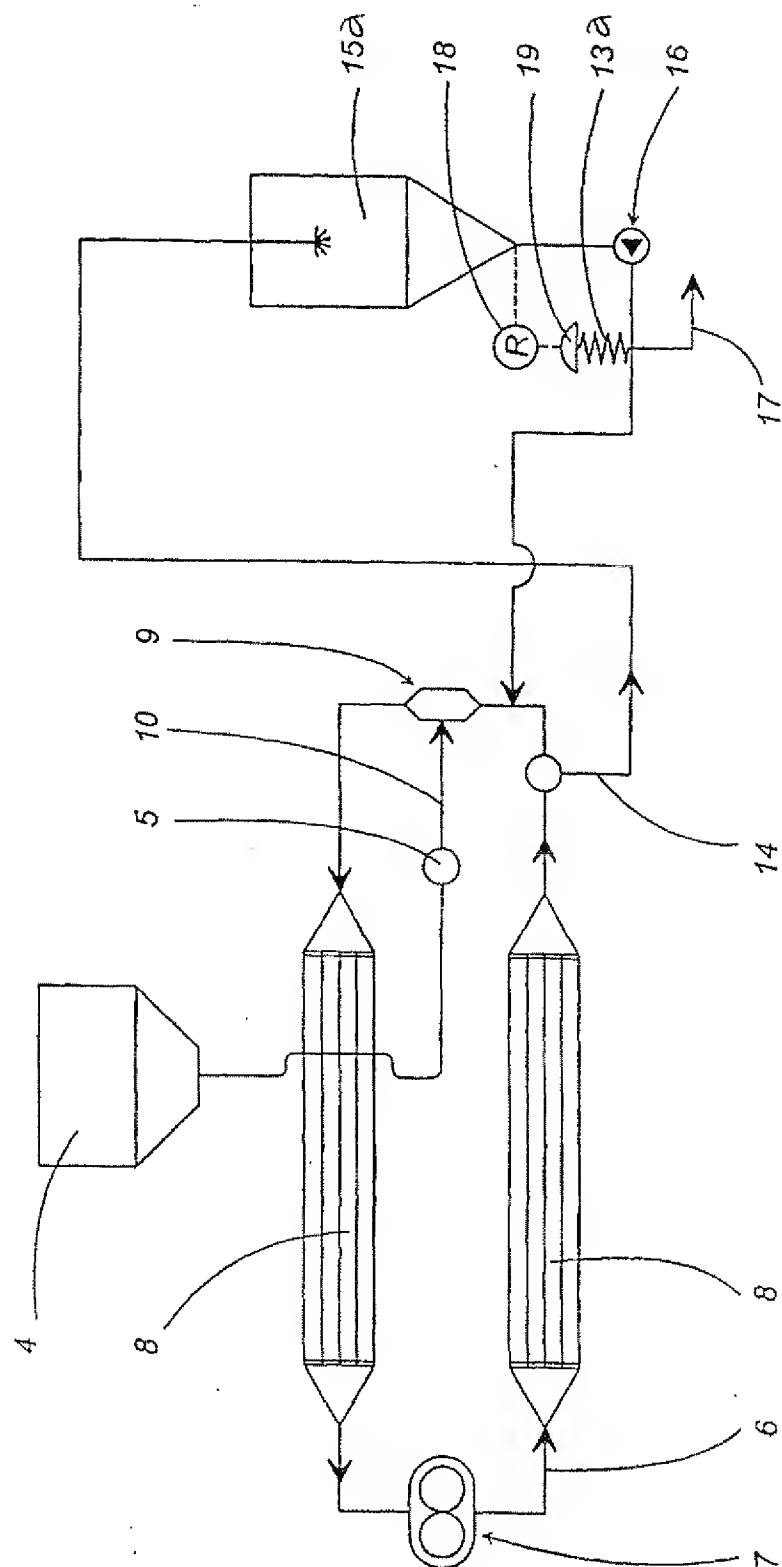


FIG. 5



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PARIS

PATENT APPLICATION

No. 74 42121

54 Stabilized moist baby food composition

61 International classification (Int. Cl.<sup>2</sup>) A 23 L 1/05, 3/00.

22 Filing date: December 19, 1974, at 4:16 p.m.

33 32 31 Claimed priority:

41 Date of public access to the application: B.O.P.I. "Lists" no. 29 of 7/16/1976

71 Applicant: GERBER PRODUCTS COMPANY, residing in the United States

72 Invention by:

73 Assignee: same as 71

74 Agent: Simonnot, Rinuy, Santarelli

This invention concerns moist precooked food products containing starch, having a long shelf life, particularly a process for preparing a moist, thickened baby food composition, the pH being a maximum of 4.5 and the dispersion being uniform for a long period of preservation.

The processes for preparing moist nutritional baby food compositions require the incorporation of a thickening agent such as starch, so that the resulting product is appealing to the consumer. Natural starches present a number of disadvantages when they are used in these compositions. For example, unmodified tapioca starch yields a thick, viscous paste when it is gelatinized by water. Consequently, it is customary to use different starches from grains and roots, which have undergone chemical modifications. These chemical modifications usually involve reticulation under the action of substances such as phosphorus oxychloride, epichlorohydrin, acrolein, divinyl sulfone, diepoxy reagents, aldehydes, glyceraldehydes, thermohardening resins, or their monomers and analogs.

Although these chemical modifications involve changing the pasty characteristics of the starches and give this paste an advantageous texture, these reticulating agents have the disadvantage of being classified as toxic substances. Thus, when they are used in edible starch preparations, care must be taken to make sure that the residual toxic reagents in the secondary products of the reaction do not remain present in this edible starch. In addition, some chemically modified starches are criticized because they are difficult for babies to digest. Consequently, obtaining the analogous starch without chemical modifications is particularly advantageous.

According to the invention, non-gelatinized tapioca starch that is heated in the presence of low moisture as described below has excellent stability for a very long time when it is used to prepare ready-to-eat baby food compositions. In fact, when this physically modified tapioca starch is incorporated into the standard baby food compositions before cooking, the resulting cooked product has rheological characteristics at least as advantageous as those of a product prepared with the most expensive type of chemically modified tapioca starch. The particular advantages are obtained when the baby food composition is acid, i.e., when its pH is lower than about 4.5.

In an equally advantageous variant, the natural tapioca starch is placed in a steam atmosphere and absorbs the moisture while it is heated. In an atmosphere of this kind, where the relative humidity is equal to 100%, the tapioca starch ultimately has a moisture level of about 26%, which is its equilibrium moisture. In addition, this starch with regulated moisture content is heated by microwaves. Under variable conditions, it is possible to obtain different levels of starch restriction. Thus, the physically modified tapioca starch is also appropriate for uses other than in baby foods.

In another embodiment of the invention, other starches may replace the tapioca starch in relatively low proportions, either before or after physical modification; the properties of the starch are further improved. Thus, it is possible to replace 10 to 25% by weight, or even more, of the tapioca starch with other unmodified starches such as wheat starch, corn starch, rice starch, rice flour, partly hydrolyzed rice starch, and partly hydrolyzed corn starch, and similar products.

Although the invention is not limited by a particular theory, it seems that the modification of the corn starch by heat and limited moisture is due to a mechanism that increases the cohesion forces in the granule. When a tapioca starch granule is subjected to internal stresses, by means of its own bonding mechanism it yields external bonds similar to those obtained by chemical modification. Although the temperature used for the modification described is clearly higher than the temperature at which the tapioca starch gelatinizes, this gelatinization does not occur, because the quantity of water present is insufficient for expansion to occur. This theory is based on tests showing that the starch treated by moisture and heat is as acceptable as chemically modified starch.

The moist-cooked baby food products according to the invention can be prepared by any known processes. For example, this composition can be prepared by formation of a suspension that is then heated, the starch being gelatinized, then industrially sterilized to the desired level of bacteria. The quantity of chemically modified tapioca starch needed to obtain an advantageous product for consumption corresponds to the normally used quantities of starch modified by the prior processes, and depends on the desired appearance as well as other practical considerations such as particular added ingredients. However, as an example, 6 to 66 g of physically modified starch per liter of final composition are enough, as a quantity of 48 to 54 g per liter of physically modified

tapioca starch yields a particularly appealing product. Different types of flour, such a potato flour, wheat flour, and similar flours are also appropriate as described, in standard quantities, or about 6 to 24 g per liter of composition. Salt and other seasonings may also be incorporated in standard quantities, and have known advantages.

Other advantages and characteristics will become apparent from the description of examples of embodiment of the invention, with reference to the attached illustration, in which Figures 1 – 3 represent the variations in viscosity over time.

#### EXAMPLE 1

This example illustrates the effect of heat and moisture treatment on the gelatinization temperature of the unmodified tapioca starch.

A. Unmodified tapioca starch (12.6% moisture) is added to water until the resulting sample contains 25% moisture with respect to the total weight. The sample is placed in a closed container and heated for 4 hours in an oven at 108°C. When the heating period has elapsed, the sample is removed from the container and allowed to air-dry until the moisture content is between 13 and 14%. Figure 1 shows a curve obtained with an amylograph (7% by dry weight in distilled water), which shows that the tapioca starch is restrained by the heat and moisture treatment. The resulting starch paste has a lower viscosity and a higher gelatinization temperature, and it is more resistant to decomposition than untreated starch paste. Similar tests are performed for varying amounts of time, and concern unmodified tapioca starch to which 16, 19, 22, or 28% of the total weight in water is added.

B. Unmodified tapioca starch is placed in a closed retort, and the steam is allowed to penetrate the container for 8 hours. The starch absorbs the moisture to an equilibrium level (about 26% of the total weight) while it is heated. The heating and moisture cause restriction of the starch molecules similar to that observed in Example 1A. Figure 2 is a curve obtained on the amylograph (7% in dry weight in the distilled water) showing that the tapioca starch is restricted by the steam treatment.

## EXAMPLE 2

The physically modified tapioca starch of Example 1 is incorporated into a banana and pineapple custard prepared with the following ingredients:

<u>Ingredients</u>	<u>Parts by weight</u>
Water	57
Banana puree	18.6
Sugar	11.5
Crushed pineapple	6.9
Tapioca starch	5.5
Orange concentrate	0.4

Citric acid is added in sufficient quantity to adjust the pH to 4.4 – 4.5.

A corresponding quantity of chemically modified tapioca is incorporated by the process described in U.S. patent no. 2,500,950 in a similar preparation of strained banana and pineapples. The consistency (in Bostwick units) is measured for an appropriate time, and Table I shows the results:

Table I  
Banana and pineapple custard  
(Bostwick Units)

	Hot	38°C	24 h	8 weeks at 21°C	8 weeks at 5°C
Treated with heat and moisture	13	5	3	2.7	1.2 (0.2 cm <sup>3</sup> of liquid separated)
Chemical modification	11	5.5	2	1.9	0.2 (1 cm <sup>3</sup> of liquid separated)



### EXAMPLE 3

Each of the following samples is mixed with 100 cm<sup>3</sup> of water so that the moisture content will be equal to about 26% of the total weight:

A. 600 g of unmodified tapioca starch

B. 540 g of unmodified tapioca starch and 60 g of unmodified flour.

The samples are placed in a 3.8-L container. The container is closed and placed in a steam atmosphere at 98°C for 16 hours. At the end of the 16 hours, these samples are air-dried until the moisture content is about 10% of the total weight, and they are incorporated with tapioca starch that has been chemically reticulated by the process described in U.S. patent no. 2,500,950 (control) in the corresponding jars of apricot pudding in the proportions indicated and according to the normal procedure for treatment of acid products.

<u>Ingredients</u>	<u>Parts by weight</u>
Apricot puree	47
Sugar	11.9
Tapioca starch	5.3
Water	35.7

Citric acid is added in a quantity sufficient to adjust the pH to 3.9-4.

The resulting products have the following characteristics:

Table II  
Consistency (Bostwick Units)

	hot 88°C	38°C	24 h	2 s	8 s at 21°C	8 s at 5°C	cm <sup>3</sup> of liquid isolated
Control	7.25	3.5	2.8	1.6	1.1	0.8	1.0
A	7.5	6.5	4.7	1.6	0.8	0.5	1.0
B	6.75	5.5	4.5	2.5	2.3	1.2	1.0

These results show that the tapioca starch treated with heat and moisture according to the invention has consistency characteristics similar to those of chemically reticulated tapioca. In addition, the results show that the combination of physically modified rice and tapioca hardens more slowly than the other two samples. The combination of tapioca and other starches and/or flour increases the pH range and improves cold stability. Figure 3 represents a curve obtained on the amylograph (7% dry base in distilled water), showing the restriction of the starch treated by the process of the invention.

It is understood that the composition described is presented only as a nonlimiting example, and can be modified in many ways without deviating from the framework of the invention.

## CLAIMS

1. Process for preparing a thickened, moist, ready-to-eat baby food from an aqueous composition of which the pH is a maximum of 4.5, characterized in that it includes incorporation into the aqueous composition of about 6 to 66 g per liter of final composition of a non-gelatinized tapioca starch that is modified by regulating the moisture content to about 15-35% of the total weight, heating the starch with the regulated moisture level to a temperature of 70°C to 130°C, and maintaining this temperature for 1 to 72 hours, filling the containers with this aqueous composition and closing the containers, then heating the aqueous composition that contains the starch for sufficient time for industrial sterilization of the composition.

2. Process for preparing a moist-thickened, stabilized, ready-to-use composition that is particularly suitable for feeding babies, characterized in that it includes incorporation of a non-gelatinized tapioca starch that is modified by regulating the moisture content to about 15-35% of the total weight and heating the starch with the regulated moisture content to a temperature of 70°C to 130°C for 1 to 72 hours.

3. Process according to either of Claims 1 or 2, characterized in that the moisture content is regulated to about 25% of the total weight.

4. Process according to either of Claims 1 or 2, characterized in that the temperature is regulated to about 95-100°C for about 16 hours.

5. Process according to Claims 1 and 2, characterized in that the heating and moisture regulation are obtained by injection of steam.

6. Process according to Claim 1, characterized in that 10 to 25% by weight of the tapioca starch is replaced by an unmodified grain starch prior to modification.

7. Process according to Claim 6, characterized in that the grain starch is rice starch.

8. Product prepared by the process according to Claim 1.

## SINGLE ILLUSTRATION

Figure 1.

### VISCOSITY

UNMODIFIED TAPIOCA

TREATED TAPIOCA

(25% H<sub>2</sub>O – 108°C – 4 h)

Figure 2.

### VISCOSITY

UNMODIFIED TAPIOCA

TREATED TAPIOCA

(12.6% H<sub>2</sub>O – 110°C – 5 h)

Figure 3.

### VISCOSITY

TAPIOCA (A)

TAPIOCA + RICE (B)

TAPIOCA (CONTROL)

A1

**DEMANDE  
DE BREVET D'INVENTION**

(21)

**N° 74 42121**

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(54) Composition alimentaire stabilisée à l'état humide pour bébé.

(51) Classification internationale (Int. Cl.<sup>3</sup>). A 23 L 1/06, 3/00.

(22) Date de dépôt ..... 19 décembre 1974, à 16 h 16 mn.

(33) (32) (31) Priorité revendiquée :

(41) Date de la mise à la disposition du  
public de la demande ..... B.O.P.I. — «Listes» n. 29 du 16-7-1976.

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(71) Déposant : Société dite : GERBER PRODUCTS COMPANY, résidant aux Etats-Unis  
d'Amérique.

(72) Invention de :

(73) Titulaire : *Idem* (71)

(74) Mandataire : Simonnot, Rinuy, Santarelli.

L'invention concerne des produits alimentaires à l'état humide cuits au préalable et contenant de l'amidon, dont la durée de conservation est longue, et plus particulièrement : un procédé de préparation de composition alimentaire cuite à l'état humide et épaissie pour bébé, le pH étant au maximum égal à 4,5 et la dispersion étant uniforme pendant un long temps de conservation.

Les procédés de préparation de compositions alimentaires nutritives à l'état humide et pour bébé nécessitent l'incorporation d'un agent épaississant tel que l'amidon, afin que le produit obtenu présente un attrait pour le consommateur. Les amidons naturels présentent divers inconvénients lorsqu'ils sont utilisés dans ces compositions. Par exemple, l'amidon non modifié de tapioca donne une pâte épaisse et visqueuse lorsqu'il est gélatinisé par l'eau. En conséquence, on utilise habituellement différents amidons de grains et de racines qui ont subi des modifications chimiques. Ces modifications chimiques impliquent habituellement une réticulation sous l'action par exemple d'oxychlorure de phosphore, d'épichlorhydrine, d'acroléine, de divinyl-sulfone, de réactifs di-époxy, d'aldéhydes, de glycidaldéhydes, de résines thermodurcissables ou de leurs monomères et analogues.

Bien que ces modifications chimiques entraînent une modification des caractéristiques pâteuses des amidons et donnent à cette pâte une texture avantageuse, ces agents de réticulation ont l'inconvénient d'être classés comme matières toxiques. Ainsi, lorsqu'ils sont utilisés dans des préparations d'amidon alimentaire, on doit s'assurer avec beaucoup de soin que les réactifs résiduels toxiques ou les produits secondaires de la réaction ne restent pas dans cet amidon alimentaire. En outre, certains amidons modifiés chimiquement sont critiqués, car difficiles à digérer par les enfants. En conséquence, l'obtention d'amidon analogue sans modification chimique est particulièrement avantageuse.

Selon l'invention, l'amidon de tapioca non gélatinisé, soumis à un chauffage en présence d'humidité réduite, comme décrit dans la suite du présent mémoire, a une stabilité

excellente pendant un temps très long lorsqu'il est utilisé dans la préparation de compositions alimentaires prêtes à l'emploi pour bébé. En fait, lorsque cet amidon de tapioca modifié physiquement est incorporé aux compositions alimentaires habituelles pour bébé avant la cuisson, le produit cuit obtenu a des caractéristiques rhéologiques au moins aussi avantageuses que celles d'un produit préparé avec un amidon de tapioca modifié chimiquement du type le plus coûteux. Les avantages particuliers sont obtenus lorsque la composition alimentaire pour bébé est acide, c'est-à-dire lorsque son pH est inférieur à environ 4,5.

Selon l'invention, les propriétés physiques de l'amidon de tapioca sont améliorées sans utilisation de réactifs chimiques par réglage de l'humidité naturelle de l'amidon (depuis environ 12,6% de poids total) à une valeur comprise entre 15 et 35% du poids total, puis chauffage à une température comprise entre 70 et 130°C pendant 1 à 72 heures. L'amidon de tapioca modifié physiquement ainsi obtenu a des caractéristiques qui, jusqu'à présent, n'ont été obtenues que par modification chimique. Plus particulièrement, lorsque la teneur en humidité totale est réglée à environ 25% et lorsque l'amidon de tapioca est chauffé à environ 95-100°C pendant environ 16 heures, l'amidon de tapioca modifié obtenu a des caractéristiques optimales lorsqu'il est utilisé dans une composition alimentaire pour bébé et dont le pH atteint au maximum 4,5.

Selon une variante également avantageuse, l'amidon de tapioca naturel est placé dans une atmosphère de vapeur d'eau et absorbe l'humidité pendant qu'il est chauffé. Dans une atmosphère de ce type, dont l'humidité relative est égale à 100%, l'amidon de tapioca a finalement une humidité de l'ordre de 26% qui correspond à son humidité d'équilibre. En outre, cet amidon dont l'humidité est réglée, est chauffé par microondes. Dans des conditions variables, on peut obtenir différents taux de restriction de l'amidon. Ainsi, l'amidon de tapioca modifié physiquement convient également à d'autres utilisations que celles des aliments pour bébé.

Selon un autre mode de réalisation de l'invention, d'autres amidons peuvent remplacer, dans des proportions relativement faibles, l'amidon de tapioca, soit avant, soit après la modification physique; les propriétés de l'amidon  
5 sont encore améliorées. Ainsi, on peut remplacer 10 à 25% en poids, ou même davantage, de l'amidon de tapioca par d'autres amidons non modifiés tels que l'amidon de blé, l'amidon de maïs, l'amidon de riz, la farine de riz, l'amidon de riz partiellement hydrolysé et l'amidon de maïs partiellement hydro-  
10 lysé et analogues.

Bien que l'invention ne soit pas limitée par une théorie particulière, il semble que la modification de l'amidon de maïs par la chaleur et l'humidité limitée est due à un mécanisme qui augmente les forces de cohésion dans le granule. Lorsque le granule d'un amidon de tapioca subit les contraintes internes, par l'intermédiaire de son propre mécanisme de liaison, il donne des liaisons externes analogues à celles obtenues par modification chimique. Bien que la température utilisée pour la modification décrite soit nettement  
15 supérieure à celle de gélatinisation de l'amidon de tapioca, cette gélatinisation ne se produit pas, car la quantité d'eau présente est insuffisante pour qu'il y ait un gonflement. Cette théorie repose sur des essais qui montrent que l'amidon traité par l'humidité et la chaleur est aussi acceptable que  
20 l'amidon modifié chimiquement.

Les produits alimentaires cuits à l'état humide pour bébé selon l'invention peuvent être préparés par tous les procédés connus. Par exemple, cette composition peut être préparée par formation d'une suspension qui est ensuite chauffée, l'amidon étant gélatinisé, puis stérilisé industrielle-  
30 ment jusqu'au taux voulu de bactéries. La quantité d'amidon de tapioca modifiée chimiquement nécessaire à l'obtention d'un produit de consommation avantageux correspond aux quantités habituellement utilisées d'amidon modifié selon les procédés  
35 antérieurs et dépend de l'aspect voulu ainsi que d'autres considérations pratiques telles que les ingrédients particuliers associés. Cependant, à titre d'exemple, 6 à 66g d'amidon



- modifié physiquement par litre de composition finale conveni-  
nent, 48 à 54 g par litre d'amidon de tapioca modifié physi-  
quement donnant un produit particulièrement attrayant. Dif-  
férents types de farine, par exemple de pomme de terre, de  
5 blé et analogues conviennent également comme décrit, dans les  
quantités habituelles, c'est-à-dire de l'ordre de 6 à 24 g  
par litre de composition. Du sel et d'autres assaisonnements  
peuvent également être incorporés en quantité habituelle et  
ont les avantages connus.
- 10 D'autres avantages et caractéristiques ressortiront  
mieux de la description d'exemples de mise en oeuvre de l'in-  
vention, faite en référence au dessin annexé sur lequel les  
figures 1 à 3 représentent les variations de la viscosité  
avec le temps.
- 15 EXEMPLE 1
- Cet exemple met en évidence l'effet du traitement par  
la chaleur et l'humidité sur la température de gélatinisation  
de l'amidon de tapioca non modifié.
- 20 A. On ajoute de l'amidon de tapioca non modifié (humidi-  
té 12,6%) à de l'eau, jusqu'à ce que l'échantillon obtenu  
contienne 25% d'humidité par rapport au poids total. On pla-  
ce l'échantillon dans un récipient fermé et on chauffe pen-  
dant 4 heures dans une étuve à 108°C. Lorsque la période de  
chauffage est écoulée, on retire l'échantillon du récipient  
25 et on le laisse sécher à l'air jusqu'à ce que la teneur en  
humidité soit comprise entre 13 et 14%. La figure 1 représen-  
te une courbe obtenue à l'amylographe (7% en poids sec dans  
de l'eau distillée) qui montre que l'amidon de tapioca est  
restreint par le traitement par la chaleur et par l'humidité.
- 30 La pâte d'amidon obtenue a une viscosité inférieure et une  
température de gélatinisation supérieure et résiste mieux  
à la décomposition que celle de l'amidon non traité. Des es-  
sais analogues sont mis en oeuvre pendant des temps varia-  
bles et concernent l'amidon de tapioca non modifié auquel  
35 on ajoute 16, 19, 22 ou 28% du poids total d'eau.
- B. On place de l'amidon de tapioca non modifié dans  
une cornue fermée et on laisse pénétrer la vapeur dans le

5 récipient pendant 8 heures. L'amidon absorbe l'humidité jusqu'à un taux d'équilibre (environ 26% du poids total) pendant qu'il est chauffé. Le chauffage et l'humidité provoquent une restriction des molécules d'amidon analogue à celle observée dans l'exemple 1A. La figure 2 est une courbe obtenue à l'amylographe (7% en poids sec dans l'eau distillée) qui montre que l'amidon de tapioca est restreint par le traitement à la vapeur d'eau.

#### EXEMPLE 2

10 On incorpore l'amidon de tapioca modifié physiquement de l'exemple 1 à une préparation de crème de banane et d'ananas préparée avec les proportions d'ingrédients suivants:

	<u>Ingrédients</u>	<u>Parties en poids</u>
	Eau	57
15	Purée de banane	18,6
	Sucre	11,5
	Ananas écrasé	6,9
	Amidon de tapioca	5,3
	Concentré d'orange	0,4

20 On ajoute de l'acide citrique en quantité suffisante au réglage du pH à 4,4-4,5.

On incorpore une quantité correspondante de tapioca modifié chimiquement selon le procédé décrit dans le brevet des Etats-Unis d'Amérique n° 2 500 950 dans une préparation analogue de banane et d'ananas tamisés. On mesure la consistance (en unités Bostwick) pendant un temps correspondant, et le tableau I donne les résultats obtenus:

Tableau I  
Crème de banane et d'ananas  
(Unités Bostwick)

	Chaud	38°C	24 h	8 semaines à 21°C	8 semaines à 5°C
5					
Traité par la chaleur et l'humidité	13	5	3	2,7	1,2 (0,2 cm <sup>3</sup> de liquide séparé)
10					
Modification chimique	11	5,5	2	1,9	0,2 (1 cm <sup>3</sup> de liquide séparé)
15					

EXEMPLE 3.

On mélange les échantillons suivants chacun avec 100 cm<sup>3</sup> d'eau afin que la teneur en humidité soit environ égale à 26% du poids total:

A. 600 g d'amidon de tapioca non modifié

B. 540 g d'amidon de tapioca non modifié et 60 g de farine non modifiée.

On place les échantillons dans un récipient de 3,8 l de capacité, on ferme ce récipient et on place dans une atmosphère de vapeur d'eau à 98°C pendant 16 heures. Au bout des 16 heures, on sèche ces échantillons à l'air jusqu'à ce que la teneur en humidité soit environ de 10% en poids total et on les incorpore avec de l'amidon de tapioca réticulé chimiquement selon le procédé décrit dans le brevet des Etats-Unis d'Amérique n° 2 500 950 (témoin) dans des pots correspondants de crème d'abricot dans les proportions indiquées et selon le procédé habituel de traitement des produits acides.

	<u>Ingrédients</u>	<u>Parties en poids</u>
35	Purée d'abricot	47
	Sucre	11,9
	Amidon de tapioca	5,3
	Eau	35,7

On ajoute de l'acide citrique en quantité qui suffit au réglage du pH à 3,9 - 4.

Les produits obtenus ont les caractéristiques suivantes:

Tableau II

		Consistance (unités Bostwick)						cm <sup>3</sup> de liqui- de isolé
		chaud 88°C	38°C	24h	2 s	8s à 21°C	8s à 5°C	
5	Témoin	7,25	3,5	2,8	1,6	1,1	0,8	1,0
	A	7,5	6,5	4,7	1,6	0,8	0,5	1,0
	B	6,75	5,5	4,5	2,5	2,3	1,2	1,0

Ces résultats montrent que l'amidon de tapioca traité par la chaleur et l'humidité selon l'invention a des caractéristiques de consistance analogues à celles du tapioca réticulé chimiquement. En outre, les résultats montrent que la combinaison du riz et du tapioca modifiés physiquement durcit moins vite que les deux autres échantillons. La combinaison de tapioca et d'autres amidons et/ou de farine augmente la plage de pH et améliore la stabilité au froid. La figure 3 représente une courbe obtenue à l'amylographe (7% en base sèche dans l'eau distillée), montrant la restriction de l'amidon traité selon le procédé de l'invention.

Il va de soi que la présente composition décrite n'a été présentée qu'à titre purement indicatif, mais nullement limitatif, et qu'on pourra lui apporter toutes modifications conformes à son cadre.

REVENDEICATIONS

1.- Procédé de préparation d'un aliment, épaissi, humide, prêt à l'emploi et pour bébé à partir d'une composition aqueuse, dont le pH est au maximum égal à 4,5, caractérisé en ce qu'il comprend l'incorporation dans la composition aqueuse d'environ 6 à 66 g par litre de composition finale d'un amidon de tapioca non gélatinisé, modifié par réglage de la teneur en humidité à environ 15-35% du poids total, chauffage de l'amidon dont l'humidité est réglée à une température comprise entre environ 70 et 130°C, et maintien de cette température pendant 1 à 72 heures, le remplissage de récipients avec cette composition aqueuse et la fermeture des récipients, puis le chauffage de la composition aqueuse qui contient l'amidon pendant un temps qui suffit à la stérilisation industrielle de la composition.

2.- Procédé de préparation d'une composition stabilisée épaissie à l'état humide et prête à l'emploi, qui convient particulièrement à l'alimentation des enfants, caractérisé en ce qu'il comprend l'incorporation d'un amidon de tapioca non gélatinisé, modifié par réglage de la teneur en humidité à environ 15-35% du poids total et chauffage de l'amidon dont l'humidité est réglée à une température comprise entre 70 et 130°C pendant 1 à 72 heures.

3.- Procédé selon l'une des revendications 1 et 2, caractérisé en ce que la teneur en humidité est réglée à environ 25% du poids total.

4.- Procédé selon l'une des revendications 1 et 2, caractérisé en ce que la température est réglée à environ 95-100°C pendant environ 16 heures.

5.- Procédé selon les revendications 1 et 2, caractérisé en ce que le chauffage et le réglage de l'humidité sont obtenus par injection de vapeur d'eau.

6.- Procédé selon la revendication 1, caractérisé en ce que 10 à 25% du poids de l'amidon de tapioca sont remplacés par de l'amidon de grain non modifié avant la modification.

7.- Procédé selon la revendication 6, caractérisé en ce que l'amidon de grain est de l'amidon de riz.

8.- Produit préparé par le procédé selon la revendication 1.

FIG \_1

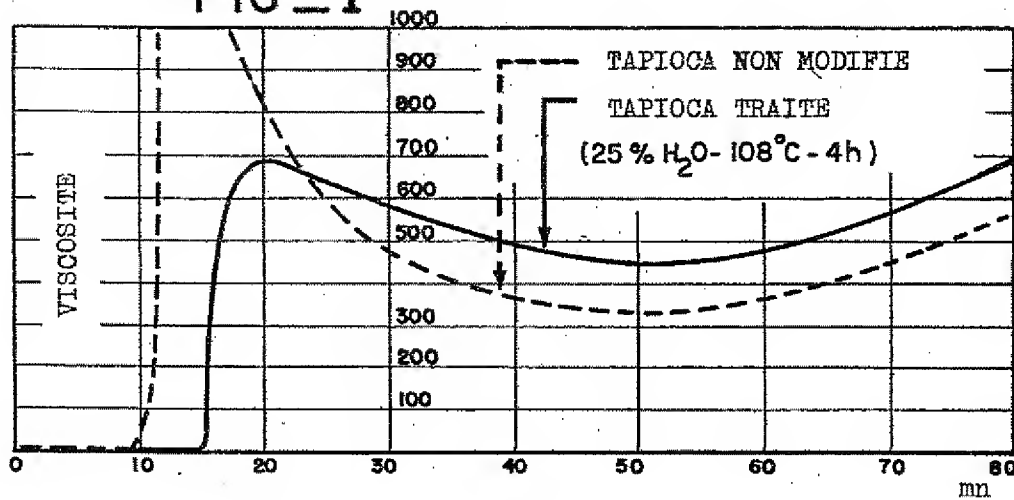


FIG \_2

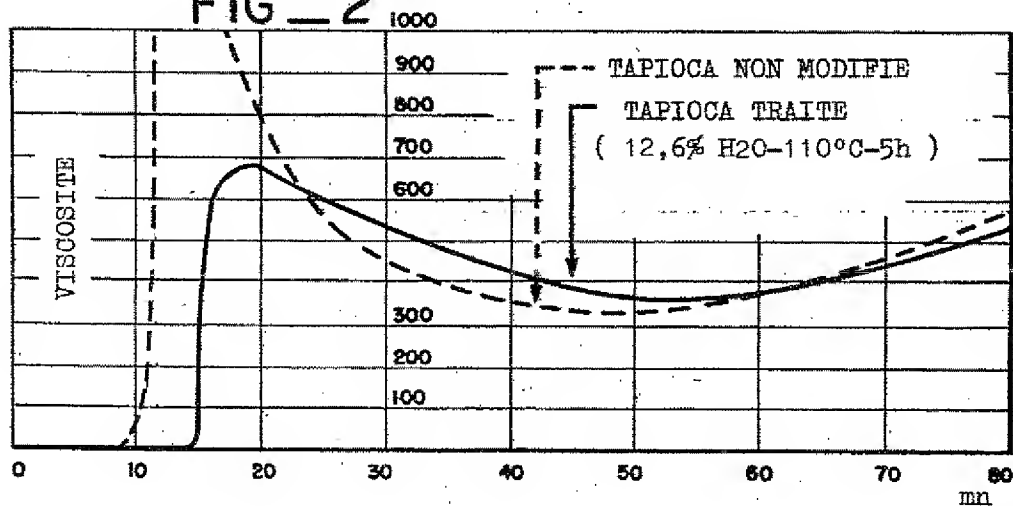
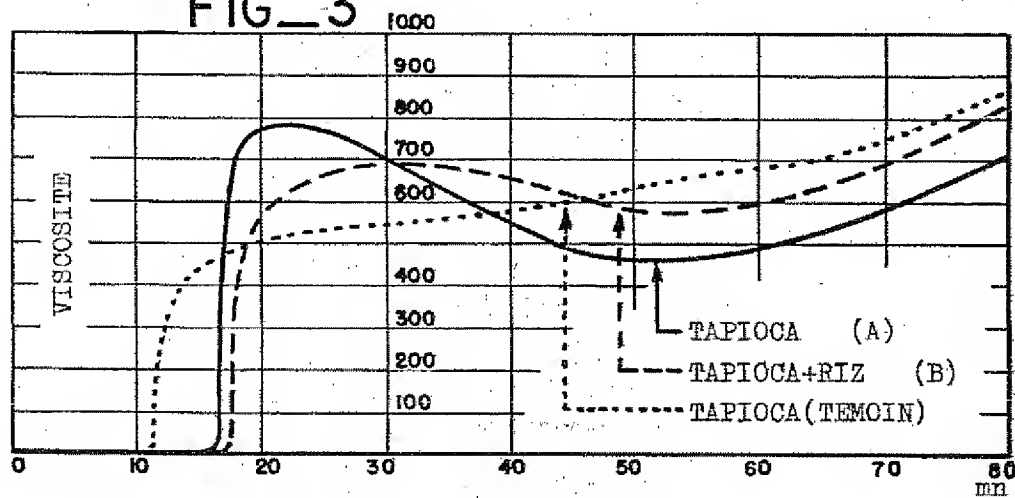



FIG \_3



F77u Ld.

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**Abstract :**

FR2621224 A

An emulsion based on the pulp of avocado or other fruit or vegetables, is prepd. by high speed grinding in an inert atmos. and in the cold, after creation of a vacuum, with addn. of juice from poultry or meat and/or a juice of vegetable origin, and of other culinary additives corresp. to the customer's tastes.

The compsn. pref. contains 60% of avocado pulp and 40% of poultry juice.

ADVANTAGE - The prod. has high quality taste and is easily stored at 4-6 deg.C. The prod. from avocado has an attractive pale green colour; the fatty globules in the avocado pulp are broken up, giving a refining of the flavour. The natural qualities of the avocado are preserved by using N2. (0/0)

**Manual Codes :**

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(12)

## DEMANDE DE BREVET D'INVENTION

A1

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(60) Références à d'autres documents nationaux apparentés :

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(73) Titulaire(s) :

(74) Mandataire(s) :

(54) Emulsion à base de pulpe d'avocat, ou d'autres fruits et légumes ou de leur pulpe, ses dispositifs de fabrication et toutes les préparations culinaires fabriquées par émulsion et obtenues par lesdits dispositifs.

(57) La présente invention concerne une émulsion à base de pulpe d'avocat ou d'autres fruits et légumes ou de leur pulpe, ses dispositifs de fabrication et toutes les préparations culinaires fabriquées par émulsion et obtenues par lesdits dispositifs.

L'émulsion selon l'invention est préparée par broyage sous azote.

Cette invention permet d'obtenir un produit alimentaire d'une grande qualité gustative et dont la conservation se fait dans des conditions tout à fait satisfaisantes.

R 2 621 224 - A1



La présente invention concerne une émulsion à base de pulpe d'avocat conservée sous azote en froid positif (4 à 6°C). Cette invention concerne aussi les dispositifs mis en oeuvre pour l'obtention de cette émulsion, lesquels dis-  
5 positifs sont également applicables à d'autres fruits et légumes ou à leur pulpe ou à toutes préparations culinaires fabriquées par émulsion.

La conservation de produits à base d'avocat a déjà fait l'objet de nombreuses recherches et différentes solutions  
10 ont été préconisées, notamment la congélation, la surgélation, les traitements par rayonnement infrarouge, ultraviolet ou par radiations ionisantes.

Cependant, de tels procédés présentent de gros inconvénients tels que la mise en oeuvre de techniques coûteuses,  
15 comme la surgélation, et la nécessité de distribuer dans certains cas ces produits à base d'avocat par des circuits commerciaux en froid négatif.

En outre, ces produits à base d'avocat ainsi préparés ne peuvent pas être utilisés immédiatement parce qu'il faut  
20 préalablement les transformer pour leur commercialisation. D'autre part, la stabilité conférée à l'avocat par congélation ou surgélation disparaît dès que l'état d'équilibre métastable dû au froid cesse.

L'avocat lyophilisé après surgélation est difficilement  
25 réhydratable dans de bonnes conditions; sa stabilité à l'état anhydre n'est de plus pas très bonne.

L'avocat stabilisé à l'aide d'agents chimiques et traité ou non par des radiations ultraviolettes ou ionisantes est accepté difficilement par les services de santé de nom-  
30 breux pays en raison de l'utilisation de certains agents chimiques stabilisants non agréés par lesdits services. En outre, ces agents chimiques ont l'inconvénient de porter gravement atteinte aux propriétés organoleptiques de l'avocat.

La présente invention remédie à ces inconvénients, y compris ceux inhérents à la commercialisation de l'avocat en circuit réfrigéré.

Elle porte en premier lieu sur le produit à base d'avocat dont les caractéristiques sont les suivantes :

-c'est une émulsion à base de pulpe d'avocat additionnée d'un jus de volaille ou d'un jus d'une autre viande ou d'un jus à base de produits d'origine végétale ou d'un mélange de ces différents jus et additionnée aussi de différents épices et additifs culinaires répondant aux goûts des diverses clientèles,

-fabriquée et conservée en froid positif,

-fabriquée, emballée et conservée sous atmosphère inerte, toutes ces phases de fabrication étant précédées de l'entrournement de la pulpe d'avocat et des autres ingrédients dans le broyeur et de la mise sous vide dudit broyeur.

Cette invention a été rendue possible par le broyage à haute vitesse obtenu par le dispositif consistant en une chaîne de fabrication composée :

-d'un broyeur à haute vitesse équipé d'un outil de coupe pouvant tourner de 500 à 5000 tours/minute; d'un dispositif de réfrigération à froid positif, d'un dispositif de mise sous vide et d'un dispositif d'insufflation d'azote, -d'une machine d'emballage équipée d'un dispositif de mise sous vide et d'un dispositif d'insufflation d'azote.

Cette chaîne de fabrication peut inclure un troisième poste de travail, en l'occurrence un dispositif de transfert placé entre le broyeur à haute vitesse et la machine d'emballage sous vide et travaillant sous atmosphère inerte. Ainsi, au moyen de cette chaîne de fabrication incluant un dispositif de transfert, est-il possible de réaliser une fabrication en continu sous atmosphère inerte et sous température de froid positif dans des conditions de travail quasi parfaites.

Cette chaîne de fabrication constituée de 3 postes de travail reliés entre eux, respectivement broyage, transfert et emballage, constitue une invention dont l'atout majeur est la préservation constante de l'atmosphère inerte et de la température à un froid positif.

Ce dispositif mis en oeuvre dans cette chaîne de fabrication constituée de trois postes de travail et décrite dans le paragraphe ci-dessus peut aussi servir au traitement d'autres fruits et légumes ou de leur pulpe ou de toutes les autres préparations culinaires fabriquées par émulsion.

En outre, le broyage à haute vitesse, de préférence de 1000 à 2000 tours/minute, apporte les avantages suivants à l'avocat :

- en crevant des globules graisseux contenus dans la pulpe d'avocat comme cela a été prouvé par des photos prises sur microscope, il contribue à affiner son goût,
- il réalise une émulsion d'une incomparable onctuosité,
- l'émulsion se présente sous une couleur vert-pâle très attractive sur le plan commercial.

Quant à l'azote, il garde à l'avocat toutes ses qualités naturelles sans la moindre altération possible en se substituant à l'oxygène même dans l'émulsion. Il en est de même pour les autres fruits et légumes.

Pour l'émulsion à base de pulpe d'avocat, les pourcentages en poids préconisés sont 60% pour la pulpe et 40% pour le jus de volaille.

L'objectif final de cette invention est en premier lieu d'ouvrir à l'avocat le marché réfrigéré et en second lieu de lancer sur le même marché une ligne de produits naturels à base de fruits ou légumes répondant parfaitement aux aspirations écologiques de la clientèle actuelle.

REVENDIGATIONS

1. Emulsion à base de pulpe d'avocat ou d'autres fruits et légumes ou de leur pulpe, caractérisée par le fait qu'elle est obtenue par broyage à haute vitesse avec l'addition d'un jus de volaille ou d'un jus d'une autre viande ou d'un jus à  
5 base de produits d'origine végétale ou d'un mélange de ces jus et avec l'addition d'épices et autres additifs culinaires répondant aux goûts des diverses clientèles, sous atmosphère inerte et sous température de froid positif et après mise sous vide.

2. Dispositif pour la fabrication d'une émulsion suivant  
10 la revendication 1 caractérisé par le fait qu'il comporte au moins 2 postes de travail :

-un broyeur à haute vitesse équipé d'un dispositif de réfrigération à froid positif, d'un dispositif de mise sous vide et d'un dispositif d'insufflation d'azote, dans lequel sont  
15 d'abord enfournés la pulpe d'avocat et les autres ingrédients et sont ensuite pratiqués la mise sous vide, l'insufflation d'azote et le broyage proprement dit,

-une machine d'emballage équipée d'un dispositif de mise sous vide et d'un dispositif d'insufflation d'azote.

20 3. Dispositif suivant la revendication 2 caractérisé par le fait qu'outre le broyeur et la machine d'emballage est prévu un poste de transfert permettant une fabrication en continu sous atmosphère inerte et sous température de froid positif.

4. Dispositif pour la fabrication d'une émulsion suivant la revendication 2 caractérisé par le fait que la vitesse préconisée pour le broyage est 1000 à 2000 tours/minute.

5. Emulsion suivant la revendication 1 caractérisée par le fait que sa composition comporte principalement 60% de pulpe d'avocat et 40% de jus de volaille.

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(54) Title: STABILIZED FRUIT PULP COMPOSITION AND A PUREE COMPOSITION COMPRISING THE SAME

(57) Abstract: A stabilized fruit pulp is described. The stabilized fruit pulp has not been subjected to temperatures that exceed 90 degrees centigrade, has substantially no active polyphenol oxidase, and is suitable for use in puree compositions that can be used in dressings, dips and spreads.



WO 2004/037017 A1

STABILIZED FRUIT PULP COMPOSITION AND A  
PUREE COMPOSITION COMPRISING THE SAME

FIELD OF THE INVENTION

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The present invention is directed to a stabilized fruit pulp composition as well as a stable puree composition comprising the same. More particularly, the invention is directed to a stabilized fruit pulp composition that has not  
10 been subjected to chemical treatment, high vacuum processing and temperatures over about 90°C. The stabilized fruit pulp composition of the present invention unexpectedly has an extended shelf life at about ambient temperature, may be added to a thickening base to produce a stable puree composition  
15 having a viscosity of at least about 5,000 centipoise, and is suitable for human consumption.

BACKGROUND OF THE INVENTION

20 Consumption of nutrients, like antioxidants and folic acid, which are abundant in fruits and vegetables, has been linked to a lower incidence of cardiovascular disease. Moreover, it is well settled that eating fruits high in soluble fiber can reduce cholesterol levels which protects against  
25 atherosclerosis.

Other advantages of having a diet high in fruit include better athletic performances, reduced risk of developing chronic bronchitis, a lowered risk of getting most common  
30 cancers (including breast cancer), as well as a lowered risk of getting cataracts.

While food products, like dressings, dips and spreads, comprising fruits have been linked to health benefits in humans, such products are often difficult to prepare for sale in commerce. This is true because the quality of food products  
5 comprising fruit often deteriorates (e.g., browns, darkens, grows mold and/or loses flavor) due to enzymatic reactions within the food product, thereby resulting in a product that has a short shelf life and does not have an appealing look or taste after spending a limited period of time in conventional  
10 commercial channels.

Known techniques have been used to inhibit the deterioration of food products comprising fruits. These known techniques include pasteurization of the fruit, high vacuum  
15 processing for removing oxygen, and chemically treating the fruit with sulfiting agents before making the food product. The above-described known techniques do not eliminate, for example, browning and darkening in food products comprising fruit, and such techniques have adverse effects on the flavor,  
20 aroma, texture and nutritional value of the fruits treated, as well as the food products prepared therefrom.

It is of increasing interest to develop a stabilized fruit pulp composition and a stable puree composition (i.e., food  
25 product) that does not, for example, easily brown, darken and lose flavor and that has an extended shelf life at about ambient temperature. This invention, therefore, is directed to a stabilized fruit pulp composition that has not been subjected to chemical treatment, high vacuum processing and temperatures  
30 over about 90°C. The stabilized fruit pulp composition of this invention can be used to make a stable puree composition having a viscosity of at least about 5,000 centipoise. Moreover, the stabilized fruit pulp composition of this invention and the

stable puree composition prepared therefrom unexpectedly have an extended shelf life at about ambient temperature and substantially the same visual, texture, aroma and taste attributes of a pulp composition and puree composition made on demand from freshly picked fruits.

#### ADDITIONAL INFORMATION

Efforts have been disclosed for making fruit pump. In U.S. Patent No. 5,384,147, a method for processing avocado pulp is described.

Other efforts have been disclosed for making stabilized fruit. In U.S. Patent No. 5,871,794, a guacamole composition with tomatillo pulp is described.

Still other efforts have been disclosed for making creamy food formulations. In U.S. Patent No. 6,284,303, a vegetable based creamy food is described.

None of the additional information above describes a stabilized fruit pulp that has not been subjected to chemical treatment, high vacuum processing and temperatures that exceed about 90°C.

#### SUMMARY OF THE INVENTION

In a first aspect, the present invention is directed to a stabilized fruit pulp composition comprising:

- (a) from about 75.0% to about 99.0% by weight water;
- (b) fruit pulp; and



(c) 0.01 to about 20.0% by weight oil

wherein the stabilized fruit pulp composition is the product of fruit comprising water, pulp, and oil that has been heated to a temperature from about 30°C to a temperature not over about 90°C for less than about three minutes and that has a hardness factor of at least about 300 dynes prior to heating.

In a second aspect, the present invention is directed to a stable puree composition comprising:

- (a) from about 20.0 to about 95.0% by weight water;
- (b) from about 0.01 to about 10.0% by weight thickening base; and
- (c) 5.0 to about 75.0% by weight of the stabilized fruit pulp composition of the first aspect of this invention

wherein the puree composition has a viscosity from about 5,000 to about 90,000 (preferably from about 18,000 to about 30,000 centipoise) centipoise, and a shelf life at about ambient temperature of at least about 65 days.

In a third aspect, the present invention is directed to a method for making the stabilized fruit pulp composition of the first aspect of this invention.

Fruit, as used herein, means the ripening part of a plant and usually the seed bearing part of a plant. Oil means naturally occurring triglycerides and their derivatives found in (i.e., originating in) the stabilized fruit pulp composition. Stabilized (or stable) means substantially no mold growth, browning, darkening and flavor loss for at least about 65 days, and preferably, for at least about 85 days when kept

in a covered (i.e., sealed) package at about ambient temperature.

Puree is defined to mean a composition comprising  
5 stabilized fruit pulp composition and thickening base whereby the composition can be used, for example, as a dressing, dip, spread, baking additive, cooking additive, or any combination thereof.

10 Thickening base is defined to mean an agent that can be flavored and colored to mimic most characteristics of the stabilized fruit pulp composition and aid in viscosity maintenance of the stable puree composition prepared therefrom.

15 Viscosity, as used herein, means deformation properties obtained with a Haake Rheometer equipped with a set of concentric, bob-in-cup, cylinders (3mm gap) wherein the bob employed has a diameter of 30.4mm, the cup has a diameter of 42mm, and shearing occurs by ramping cylinder oscillation at a  
20 rate from 0 to 135 reciprocal seconds at ambient temperature. Viscosity reported is taken at a shear rate of 10 reciprocal seconds.

Hardness factor, as used herein, means the hardness value  
25 obtained on a 4 mm thick slice of fruit (using a TA-TX2 Texture Analyzer made available by SMS Stable Micro Systems) at ambient temperature being subjected to compression using a 50 kg load cell moving at 1mm/sec, with the hardness factor being determined from the observed first peak in a force distance  
30 curve.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

There is no limitation with respect to the type of fruit  
5 that may be used to make the stabilized pulp composition and  
stable puree composition of the present invention, as long as  
the fruit is one that is suitable for human consumption.  
Often, the fruit used in this invention is an avocado, banana,  
mango, guava, fig, papaya, kiwi, star fruit, pineapple,  
10 combination thereof, or the like. In a most preferred  
embodiment, the fruit employed in this invention is avocado.

When selecting the fruit to make the stabilized fruit pulp  
composition and stable puree composition of this invention, the  
15 fruit is generally picked from about 1 to about 4 weeks, and  
preferably, from about 1 to about 3 weeks, and most preferably,  
from about 2 to about 3 weeks prior to being ripe. The picked  
fruit is then stored in a dark room (at a temperature between  
about 10°C to about 35°C) for less than about 1.5 weeks, and  
20 preferably, less than about 1 week, and most preferably, less  
than about 3 days. In an especially preferred embodiment, the  
fruit selected for use in this invention, after being picked or  
harvested, is subjected to storage conditions of relative  
humidity between about 40-70%, and most preferably, between  
25 about 50-65%.

When preparing the fruit selected for use in this  
invention, the fruit is, in no particular order, peeled and  
depitted or cored, if necessary. The resulting fruit flesh is  
30 then mashed to a desired texture or consistency to produce  
fruit pulp. In a preferred embodiment, the fruit pulp produced  
is prepared from fruit having a hardness factor from about 300  
dynes to about 3,000 dynes. The fruit pulp is then heated

(e.g., in a water bath, in an oven, microwave oven, or with adiabatic heating in a high pressure vessel) to a temperature from about 30°C to a temperature not over about 90°C for less than about 3 minutes, and preferably, from about 10 seconds to  
5 about 2.5 minutes, thereby producing a stabilized fruit pulp having from about 0.01 to about 20.0% (preferably at least about 5.0% and most preferably at least about 10.0%) by weight oil and substantially no active enzymes (i.e., all quality detrimental enzymes like amylase, lipoxxygenase, polyphenol  
10 oxidase are substantially inactivated).

In yet another preferred embodiment, acidulant is added to and mixed within the fruit pulp prior to heating. When acidulant is used, it typically makes up from about 0.01 to  
15 about 5.0% by weight of the fruit pulp being heated. The acidulant which may be used in this invention includes those which are typically used in food compositions, like lactic acid, citric acid, sorbic acid, hydrochloric acid, ascorbic acid, phosphoric acid, mixtures thereof, and the like.

20

There is no limitation with respect to the thickening base which may be used in this invention as long as the base is suitable for human consumption. Such a thickening base is typically a citrus fiber or vegetable puree (or mixture  
25 thereof) containing composition comprising water insoluble fibers. Therefore, the thickening base employable in this invention has food components derived from, for example, plant material that are generally resistant to digestion and absorption in the human small intestine. The thickening base  
30 can be, for example, sweetened or unsweetened applesauce, or sweetened or unsweetened cellulosic material derived from the core of an orange or other citrus fruits. Such a cellulosic material can comprise rag and small amounts of peel from the

citrus fruit. Typically, the citrus fiber that makes up the thickening base of the present invention is substantially similar to or the same as the texturizing properties of the stabilized fruit pulp composition used to make the stable puree composition of this invention. Preferably, the citrus fiber within the thickening base, in dry form, has a particle size from about 50 microns to about 200 microns, including all ranges subsumed therein, and the types of thickening bases that may be used in this invention include those made commercially available from suppliers like Herbstreith & Fox, BASF Corporation and FMC Corporation.

When making the stable puree composition of the present invention, typically from about 20.0 to about 95.0%, and preferably, from about 25.0 to about 75.0%, and most preferably, from about 50.0 to about 65.0% by weight water is combined with from about 0.01 to about 10.0%, and preferably, from about 0.01 to about 7.5%, and most preferably, from about 1.0 to about 3.5% by weight thickening base, based on total weight of the stable puree composition and including all ranges subsumed therein. The resulting base combination is then mixed (preferably with conditions at ambient temperature and atmospheric pressure) to produce a base suspension.

Optional additives may be employed in this invention, and added, for example, to the base combination. The optional additives which may be used include artificial and natural food grade flavors and colors; protein powders like whey protein; preservatives like potassium sorbate and sodium benzoate; gums like pectin, xanthan gum and guar gum; emulsifiers like monoglycerides, diglycerides, and polysorbate; acids to modify pH like lactic acid and hydrochloric acid; spices like salt, ginger, nutmeg, basil, cinnamon, onion, garlic and pepper; and

texturizing agents like microcrystalline cellulose (e.g., Avicel as made available by FMC Corporation).

While such optional additives may be added at anytime  
5 during the process for making the stable puree composition of this invention, they are preferably added to the base combination and just prior to generating the base suspension. In a preferred embodiment, however, when flavor is a desired optional additive, the flavor is added just prior to generating  
10 the puree composition of this invention. In yet another preferred embodiment, about 5.0 to about 10.0% by weight of the total water added to make the base suspension is added with the optional additives.

15 The flavors used in this invention may be added according to taste and the colors are added according to color preferences. The acids to modify pH are added to bring the pH of the stable puree composition to at least about 3.0, but less than or equal to about 4.5. The preferred amount of acid added  
20 to the base combination results in a stable puree composition having a pH from about 3.3 to about 4.2. The emulsifiers and preservatives are added to enhance stability of the puree composition. The spices employed are added to taste, the gums are added to maintain a desired stable puree composition  
25 viscosity and the protein powders are added as desired. Generally, the amount of optional additives employed in the puree composition does not exceed 10.0% by weight of the total weight of the stable puree composition.

30 Subsequent to generating the base suspension, the same is subjected to a standard colloid mill having gap widths from about 125 microns to about 1250 microns, and preferably, from about 250 microns to about 750 microns, or a homogenizer

operating under pressures from about 30 to about 300 bar. The resulting milled or homogeneous suspension is then combined with stabilized fruit pulp composition to produce the stable puree composition of this invention. The amount of stabilized fruit pulp composition employed is typically from about 5.0 to about 75.0%, and preferably, from about 10.0 to about 50.0%, and most preferably, from about 15.0 to about 25.0% by weight stabilized fruit pulp composition, based on total weight of the stable puree composition.

10

In an especially preferred embodiment, a fat additive may be added to the base suspension. Such a fat additive can be natural or synthetic and is a component delivered to the stable puree composition distinct from any oil delivered with the stabilized fruit pulp composition. The fat additive can be, for example, corn oil, cotton seed oil, olive oil, canola oil, palm oil, safflower oil, rapeseed oil, soybean oil, mixtures thereof and the like. The fat additive may also be a fat substitute such as fatty acid-esterified propoxylated glycerin compositions as well as sucrose fatty acid polyesters. When employed, the fat additive makes up from about 0.5 to about 25.0%, and preferably, from about 5.0 to about 20.0% by weight of the puree composition, based on total weight of the stable puree composition.

25

The stable puree composition of this invention is suitable for numerous food applications. For example, the composition may be used as a dressing, dip or spread, or as cooking or baking additive. Such a stable puree composition can be packaged in conventional food packaging (e.g., plastic or glass bottles) and hot filling (i.e., pasteurization) is not required to maintain product stability.

30

The following examples are provided to facilitate an understanding of the present invention. The examples are not intended to limit the scope of the invention as set forth in 5 the claims.

#### Example 1

Avocado, having a hardness factor of about 300 dynes, was 10 harvested about 2.5 weeks prior to being ripe and stored in a dark room kept at about 25°C (relative humidity about 55%) for about two (2) days.

The avocado was cut in half and depitted to produce an 15 avocado half. The avocado half was peeled, mashed and mixed with 0.5% by weight ascorbic acid and then heated to about 85°C for 3.0 minutes. The heated mashed avocado was cooled, thereby producing stabilized avocado pulp composition having about 15% by weight oil and 80.0% by weight water, with substantially no 20 active polyphenol oxidase.

#### Example 2

A base suspension was prepared by mixing the following 25 ingredients:

Ingredient	Weight %
Thickening Agent (Citrus Fiber)	3.0%
Sunflower Oil	12.0%
Whey Protein	0.5%
Pectin	0.3%
Potassium Sorbate	0.1%
Water	Balance



The resulting base composition was mixed to produce a base suspension. The base suspension was homogenized in a homogenizer at a pressure of about 150 bar to produce a homogenized suspension.

5

### Example 3

A stable puree composition was made by mixing 80% by weight of the milled suspension of Example 2 with 20% by weight of the stabilized avocado pulp of Example 1. The stable puree composition was sealed in a package and kept at ambient temperature. After about 85 days, the package was opened and no browning, darkening, mold formation or flavor loss was observed on the stable puree composition of this invention.

15

### Example 4

A puree composition similar to the one described in Example 3 was made except that the avocado pulp added to the milled suspension did not have the hardness factor of the avocado used in Example 2 and was not picked, stored and heated under the conditions described in Example 1. The resulting puree composition was sealed in a package at and kept at ambient temperature. After about one (1) day, the package was opened and browning and darkening was observed on the puree composition. The product was essentially not suitable for human consumption. After about 14 days, mold was observed on the puree composition and the product was essentially not safe for human consumption.

30

The results of the experiments above indicate that pulps and puree compositions prepared via this invention, unexpectedly, have a superior shelf life.

**Claims**

1. A stabilized fruit pulp composition comprising:
  - (a) from about 75.0% to about 99.0% by weight water;
  - (b) fruit pulp; and
  - (c) from about 0.01 to about 20.0% by weight oil

wherein the stabilized fruit pulp composition is the product of fruit comprising water, pulp, and oil that has been heated to a temperature from about 30°C to a temperature not over about 90°C for less than about three minutes and that has a hardness factor of at least about 300 dynes prior to heating.

2. The stabilized fruit pulp composition according to claim 1 wherein the fruit is an avocado, banana, mango, guava, fig, papaya, kiwi, star fruit, pineapple, or a mixture thereof.

3. The stabilized fruit pulp composition according to claim 1 wherein the fruit is an avocado.

4. The stabilized fruit pulp composition according to claim 1 wherein the fruit has been picked 1 to 4 weeks prior to being ripe and stored in a dark room for less than about 1.5 weeks at a temperature of about 15°C to about 30°C before being heated.

5. The stabilized fruit pulp composition according to claim 4 wherein the fruit is subjected to storage conditions of relative humidity between about 40-70% before being heated.

6. The stabilized fruit pulp composition according to claim 1 wherein the fruit has been heated for about 10 seconds to about 2.5 minutes.

7. The stabilized fruit pulp composition according to claim 1 wherein the stabilized fruit pulp composition can be added to the composition comprising a thickening base to produce a puree composition.

8. A stable puree composition comprising:

- (a) from about 20.0% to about 95.0% by weight water;
- (b) from about 0.01 to about 10.0% by weight thickening base; and
- (c) from about 5.0 to about 75.0% by weight stabilized avocado pulp composition

wherein the puree composition has a viscosity from about 5,000 to about 90,000 centipoise, and a shelf life at about ambient temperature of at least about 65 days.

9. The stable puree composition according to claim 8 wherein the stable puree composition has a pH from at least about 3.0 to less than or equal to about 4.5.

10. The stable puree composition according to claim 8 wherein the stable puree composition can be used as a dressing, dip, spread, cooking additive or baking additive.

11. The stable puree composition according to claim 8 wherein the stable puree composition further comprises from about 0.5 to about 25.0% by weight of a fat additive.

12. The stable puree composition according to claim 8 wherein the stable puree composition further comprises food grade flavoring, food grade coloring, protein powder, preservative,

emulsifier, acid, spices, texturizing agent or a mixture thereof.

13. The stable puree composition according to claim 8 wherein the fruit has been picked 1 to 4 weeks prior to being ripe and stored in a dark room for less than about 1.5 weeks at a temperature of about 15°C to about 30°C before being heated.

14. The stable puree composition according to claim 8 wherein the fruit has been subjected to storage conditions of relative humidity between about 40-70% before being heated.

15. The stable puree composition according to claim 8 wherein the stable puree composition is shelf stable at ambient temperature for at least about 65 days.

16. The stable puree composition according to claim 8 wherein the stable puree composition has a viscosity from about 18,000 to about 30,000 centipoise.

17. A method for making a stabilized fruit pulp composition comprising the steps of:

- (a) harvesting fruit about 1 to 4 weeks prior to being ripe;
- (b) storing the harvested fruit in a dark room at a temperature from about 10°C to about 35°C for less than about 1.5 weeks;
- (c) in no particular order, peeling, depitting or coring, if necessary, the fruit and mashing the fruit to produce fruit flesh;

- (d) mixing the fruit flesh with about 0.01 to about 5.0% by weight acidulant to produce an acidulant and fruit flesh mixture;
- (e) heating the acidulant and fruit flesh mixture to a temperature not over about 90°C for less than about 3 minutes

wherein the fruit has a hardness factor of at least 300 dynes prior to heating.

18. The method for making a stabilized fruit pulp composition according to claim 17 wherein the fruit is avocado, banana, mango, guava, fig, papaya, kiwi, star fruit, pineapple or a mixture thereof.

19. The method for making a stabilized fruit pulp composition according to claim 17 wherein the stabilized fruit pulp composition comprises from about 75.0 to about 99.0% by weight water; fruit pulp; 0.1 to about 20.0% by weight oil; substantially no quality detrimental enzyme activity after heating.

# INTERNATIONAL SEARCH REPORT

International Application No.

PCT/EP 03/09649

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 A23L1/212 A23B7/005

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A23L A23B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, FSTA

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	the whole document	17
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents:

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## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/EP 03/09649

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
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Information on patent family members

International Application No

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